



# Cisco Unified Operations Manager Tutorial

## Cisco Unified Communications Management Suite



# About This Tutorial

- Explore the Unified Communications environment and tools
- Highlight the key features of Cisco Unified Operations Manager
- Follow along with various scenarios detailing how to use Operations Manager for managing Unified Communications
- Provide system administration guidelines for Operations Manager
- Provide links to additional information on Operations Manager



## About This Tutorial

This tutorial on Cisco Unified Operations Manager (OM) provides self-paced training focused on using the key features of the OM application.

The tutorial is structured as a series of self-paced chapters that explore the architecture, key features, common usage, and system administration guidelines for the product. Also included as part of the tutorial is a helpful reference section containing links to technical documents on component products, concepts, and terminology. The tutorial material is presented through text, illustrations, hypertext links, and typical scenarios.

This tutorial is an excellent resource to introduce you to using the many features found in the OM product as well as its interaction with other related products.

# How the Tutorial Is Organized

Chapter 1 Introduction	Explore the Unified Communications environment, the challenges, and tools for managing
Chapter 2 Operations Manager (OM) Product Features	Learn about the key features of OM for managing the Unified Communications infrastructure
Chapter 3 Operations Manager Scenarios	Using several examples, learn how to deploy OM and use many of its features for managing the Unified Communications infrastructure
Chapter 4 System Administration Guidelines	Review important system requirements, installation guidelines, and system administrative functions
Chapter 5 Helpful Links to Reference Material	A comprehensive set of links to more information on Operations Manager and related topics

## How This Tutorial Is Organized

The tutorial is divided into five chapters:

### Chapter 1: Introduction

This chapter describes Unified Communications and highlights both the need for management and the challenges often encountered when managing Unified Communications devices and services.

### Chapter 2: Operations Manager Product Features

This chapter discusses the key features of the Operations Manager (OM) application. The product is presented through both discussions of the major functional components and screen shots of many key features.

### Chapter 3: Operations Manager Scenarios

This chapter walks you through step-by-step examples to provide hands-on experience using the Operations Manager application. The case studies begin with steps on how to get started, followed by using various features to manage the Unified Communications devices and services.

### Chapter 4: System Administration Guidelines

This chapter provides information about the Operations Manager client and server requirements, software installation guidelines, security administration, periodic maintenance, and troubleshooting tips.

### Chapter 5: References

This chapter contains a list of additional product information, such as links to related white papers and documentation.

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# Cisco Unified Operations Manager

## Introduction

### Chapter 1



# Chapter 1 Outline

- Managing Unified Communications
  - Environment
  - Challenges
- Cisco's Solution
  - Unified Operations Manager
  - Unified Service Monitor



## Chapter 1 Outline

This chapter will set the stage for managing Unified Communications devices and services, and introduce you to a family of Cisco products that can help you overcome the challenges to managing the Unified Communications environment.

Chapter 2 will then focus on all the features provided specifically by Operations Manager, followed by several scenarios in Chapter 3 that illustrate how to deploy and use some of the key features of the product. Chapter 4 will present system administration topics, including installation requirements, post installation tasks, features or tasks specific to the system administrator, and troubleshooting tips. Finally, use Chapter 5 as a way to find all your links to important information on Unified Communications, Operations Manager, and other related topics.



# Managing Unified Communications

- **Managing Unified Communications**
- Cisco's Solution



# What is Unified Communications?

Cisco Unified Communications is an integrated and open portfolio of products and applications that unify and simplify all forms of communications, independent of location, time, or device



Unified Communications that ....

- Eliminate Chaos
- Control Costs
- Improve Processes
- Increase Satisfaction
- Enhance Productivity
- Improve Competitive Advantage

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## What is Unified Communications?

Today's organizations must contend with increasingly complex communication environments featuring a wide array of communication methods. Employees, business partners, and customers communicate with one another through infinite combinations of phones, voice messaging, e-mail, fax, mobile clients, and rich-media conferencing. Too often, however, these tools are not used as effectively as they could be. The result is information overload and misdirected communications that delay decisions, slow down processes, and reduce productivity.

Unified Communications solutions have proven their ability to help organizations solve such problems, enabling them to streamline business processes and reduce costs. For years, companies of all sizes have been realizing the benefits that carrying voice, data, and video communications across a common, IP infrastructure can bring.

Today, with the Cisco Unified Communications system of voice and Unified Communications products, those benefits are greater than ever. Instead of simply connecting products, the Cisco Unified Communications system provides structure and intelligence that helps organizations integrate their communications more closely with business processes, and ensure information reaches recipients quickly, through the most appropriate medium.

Businesses can collaborate in real time using advanced applications such as videoconferencing; integrated voice and Web conferencing; mobile IP soft phones; voicemail; and more—from an integrated, easy-to-use interface. The solution saves time and helps control costs, while improving productivity and competitiveness. In a 2005 Sage Research study, 86 percent of companies using Unified Communications reported that productivity benefits have grown. More than 60 percent reported savings of three or more hours per week for each mobile worker. Such studies confirm that migrating to a Unified Communications system provides a substantial return on investment (ROI) and a reduced total cost of ownership (TCO).

The Cisco Unified Communications portfolio is an integral part of the Cisco Business Communications Solution—an integrated solution for organizations of all sizes that also includes network infrastructure, security, network management products, wireless connectivity, and a lifecycle services approach, along with flexible deployment and management options, financing packages, and third-party communications applications.

# Managing Unified Communications The Environment

Effective management of Unified Communications systems requires management of all components

Applications



Endpoints



Call Control



Infrastructure



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## Managing Unified Communications

Not long ago, Unified Communications was synonymous with IP telephony and organizations adopted it primarily to save money on phone bills and network support. But today, Unified Communications encompasses so much more than IP telephony, and companies are capitalizing on their quality of service (QoS)-enabled IP networks that they built for IP telephony for more advanced multi-media applications.

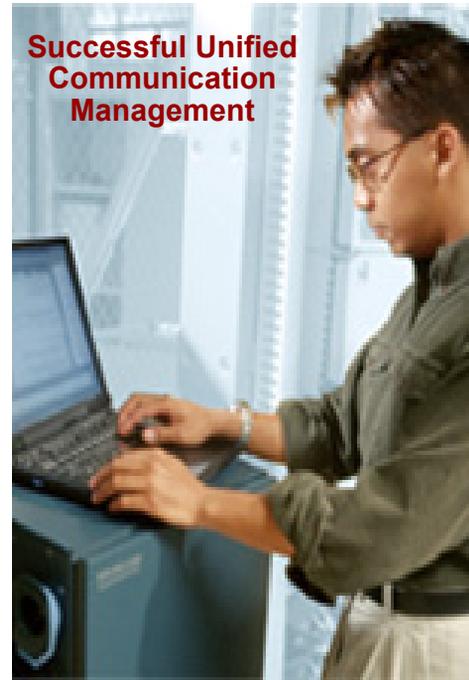
The Unified Communications environment consists of the IP transport devices and the IP communications intelligence built into the Unified Communications application services. It is a comprehensive system of powerful enterprise-class solutions which include:

- IP Telephony—provides the full array of telephony services users expect in a business communications solution. It bridges IP communications protocols with the existing time-division multiplexing (TDM) network. It enables you to use either the TDM public network or managed IP networks to connect locations.
- Unified Messaging—delivers powerful messaging tools (e-mail, voice, and fax messages sent to one inbox) and intelligent voice messaging over a single integrated system
- Rich Media Collaboration—bringing video and high-quality audio together to make conferencing as productive and natural as face-to-face meetings.
- IP Customer Contact solutions—delivers intelligent contact routing, integrated interactive voice response, and multimedia contact management to contact center agents over an IP network.

Enabled by an intelligent wired or wireless network, communication now extends to wherever your employees are. Deployed as a comprehensive system, Unified Communications is more than dial-tone replacement. The benefit is a dramatic improvement in operational efficiencies, organizational productivity, and customer satisfaction. With the deployment of Unified Communications you create a collaborative workforce, increase competitive advantage, and deliver measurable ROI. A smooth operation does not come without obstacles; the Unified Communications environment needs to be carefully designed, deployed, and managed.

# Managing Unified Communications Management Focus

1. Ensure infrastructure is rock solid and working properly
2. Implement QoS techniques and gather measurable metrics
3. Regularly monitor Unified Communications applications for availability of services
4. Monitor and test various end points (I.e. IP phones) across different boundaries



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## Management Focus

Unified Communications and network management begins with visibility into the network infrastructure, its performance, the applications used across the network, and the end points – the users and their computers or IP phones. Your job is to understand how to obtain visibility into these components, gather information about the components and their performance, and understand your network and how it can work for you. Cisco's infrastructure and network management tools are the starting points. The upcoming pages will highlight these areas of focus in more detail.

# Managing Unified Communications

## Managing The Infrastructure

IP infrastructure is used to transport voice, video, and data traffic

- Provide details about devices, connectivity, and Unified Communications applications, services, and relationships
- Monitor devices for conditions that could lead to service degradation
- Monitor network paths to verify compliance with acceptable latency / jitter
- Provide device and telephony-related metrics and details

### Cisco Voice Enabled Routers & Switches



## Managing the Infrastructure

The first area of focus in Unified Communications management should start with the infrastructure, ensuring that the foundation is rock solid and properly configured to handle Unified Communications. Routers and switches comprise the IP transport devices in your Unified Communications environment. There are few important factors when choosing a router or switch for Unified Communications, including the number of phones, which call-processing solution you select, and the other functions the router will perform.

Technology-specific resources available in Cisco devices can assist you with network design, configuration, maintenance and operation, troubleshooting, and other network management support.

Secondly, focus on quality of service (QoS) for Unified Communications by monitoring performance using QoS metrics and implementing QoS techniques where needed. Next, let's look at various service quality and voice quality metrics.

# Managing Unified Communications

## Measurable Service Quality Metrics



<b>Response Time / Latency</b>	The elapsed time between the end of a query on one end of a conversation pair and the beginning of a response from the other end of a pair. Latency, a function of response time, is any characteristic of a network or system that increases the response time.
<b>Availability / Outages</b>	Critical to IP Communications is the availability of the network and the IPC services (CallManager, Unity, SRST)
<b>Jitter</b>	<p>The amount of variation in the delay of received voice/video packets. Packets are sent in a continuous stream with the packets spaced evenly apart.</p> <p>Due to network congestion, improper queuing, or configuration errors, this steady stream can become lumpy, or the delay between each packet can vary instead of remaining constant which is desired for good quality.</p>
<b>Network Utilization Patterns</b>	Trending how the network is being used, by protocols, users, and how the patterns are changing is critical in a converged data/voice networks
<b>Thresholds</b>	User defined limits that when metrics cross the threshold value, it triggers an alert or event condition

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## Measurable Service Quality Metrics

Network managers look for measurable statistics such as jitter, packet loss, and end-to-end network latency, in order to ensure acceptable service levels. Familiarize yourself with these metrics and what they mean in terms of absolute value, or when comparing or trending over time.

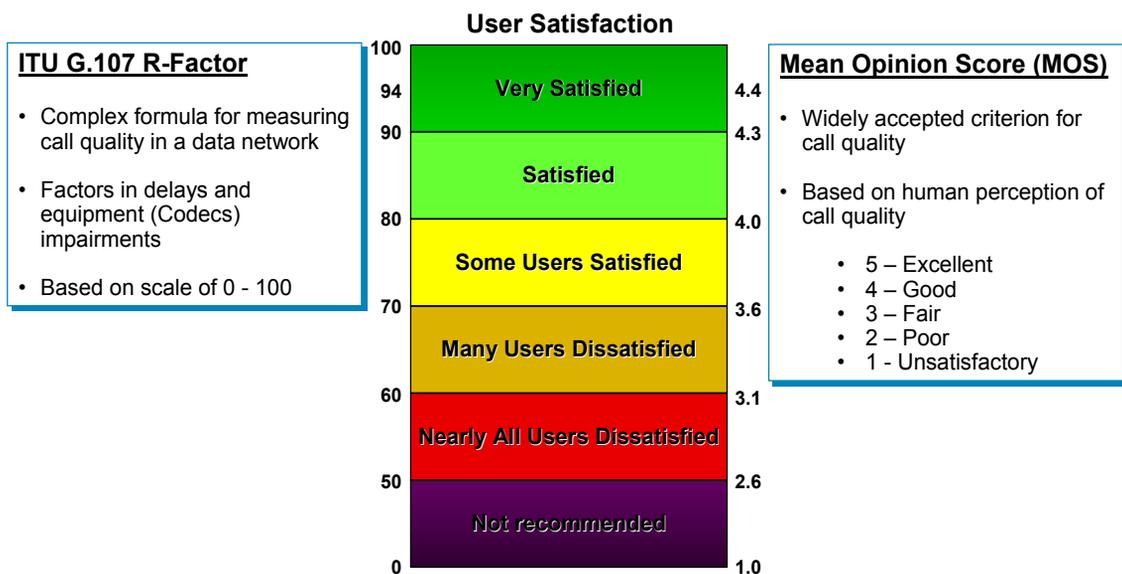
Utilization, response time, latency (delays), packet loss, and availability metrics are familiar statistics to most network managers. What may be new to some managers is the metric, Jitter. To better explain jitter, let's look at an example:

- If a source device sends multiple packets consecutively to a destination at ten millisecond intervals, and if the network is operating optimally, the destination should receive them at ten-millisecond intervals. However, delays (i.e. queuing, or arriving through alternate routes) in the network can cause inter-packet arrival delay of greater or less than ten milliseconds.
- Positive jitter implies that the packets arrived at intervals of more than ten milliseconds. If they arrive twelve milliseconds apart, then positive jitter is equivalent to two milliseconds. Negative jitter is computed similarly. Greater values of jitter (both positive and negative) are undesirable for voice networks, and a jitter value of zero is ideal for delay-sensitive networks.
- Voice and video traffic is recommended to have 30 ms of jitter or less.

As with all monitoring metrics, the statistics should be gathered periodically and evaluated regularly for upward trends or irregular conditions.

# Managing Unified Communications

## Measurable Voice Quality Metrics



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## Measurable Voice Quality Metrics

These types of metrics provide the network manager with voice quality statistics that can gauge the user's call satisfaction level.

Traditionally, measuring call quality has been very subjective: a human picks up the phone and listens to the voice and provides his or her perception on the quality of the call. In fact, this is the basis for the widely accepted criterion for call quality, the *Mean Opinion Score (MOS)*.

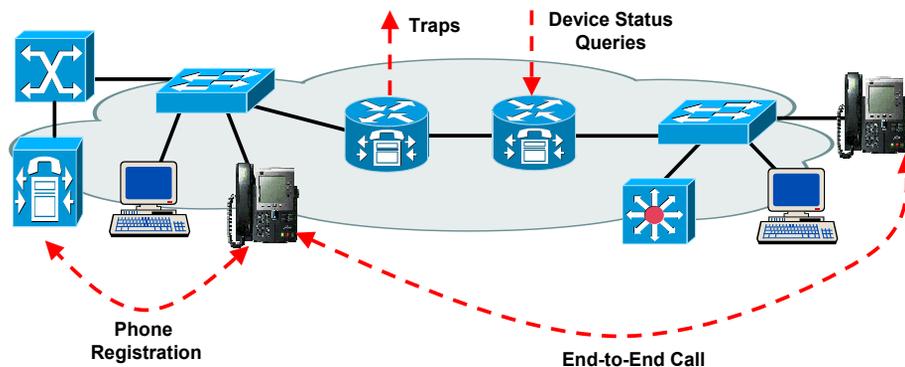
In the past, a group of humans would listen to various calls and rate them from 1 to 5 or Unsatisfactory to Excellent. Obviously, this is not a very good mechanism for evaluating call quality for a large number of calls (never mind the privacy issues!). Luckily, many algorithms have become quite adept at predicting the human perception of a call. Unfortunately, some of these algorithms do not scale well, and are not suited for determining voice quality when the calls are transmitted over data networks since many other factors now come into play.

G.107 R factor is an algorithm that was developed specifically for determining voice quality in a data network. Among other things, this algorithm takes into account delays and equipment impairment factors, and creates a score between 0 and 100 (poor to excellent). So using G.107 would be an excellent way to gather measurable statistics for call quality. However, since the MOS is still the most widely used metric for call quality, converting the R factor into a MOS value is desirable.

# Managing Unified Communications

## Managing Call Control Services and Applications

- Real-time monitoring and alerting on the availability of services
  - Are voice gateways and CallManagers reachable?
  - Are call conferencing and messaging available?
  - Can IP phones obtain a dial tone, register, or complete calls?
- Proactive testing to detect potential impacts to service early on



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## Managing Call Control Services and Applications

Other areas of focus are the Unified Communications applications and the end points in the network – users and their computers or IP phones. Unified Communications is dependent on CallManagers and gateways working properly. These Unified Communications services provided by both the transport devices and the Unified Communications applications are critical to successful operations. Therefore, it is critical to monitor these services for availability. The following represents a sampling of monitoring functions available to the network manager:

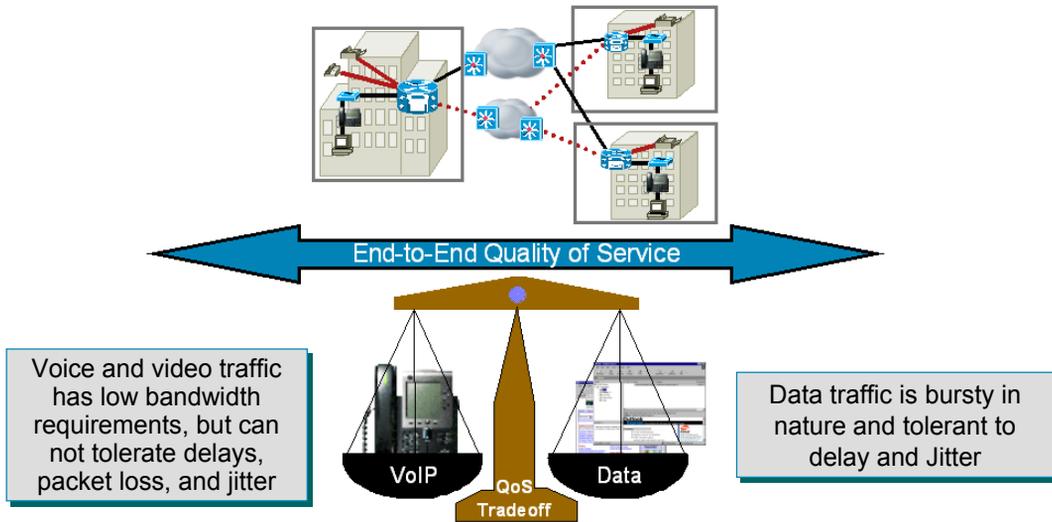
- Diagnostic Tests – Run tests to determine the state of the services provided by an Unified Communications application. This can be done by generating synthetic tests or monitoring actual transactions. Results can be compared against pre-defined thresholds and used to trend overall behavior.
- Polling – Use SNMP queries to retrieve transport device status to determine overall health.
- Traps – Forward SNMP traps (alerts of conditions) from transport devices to receive real-time indication of potential problems.

And finally, monitoring and testing the end points (i.e. IP phones) in the network will ensure continuous communication across different boundaries.

# Managing Unified Communications

## The Challenges

With converged networks, network administrators need to ensure adequate availability and bandwidth for deploying multiple services over IP packet-based networks



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## The Challenges

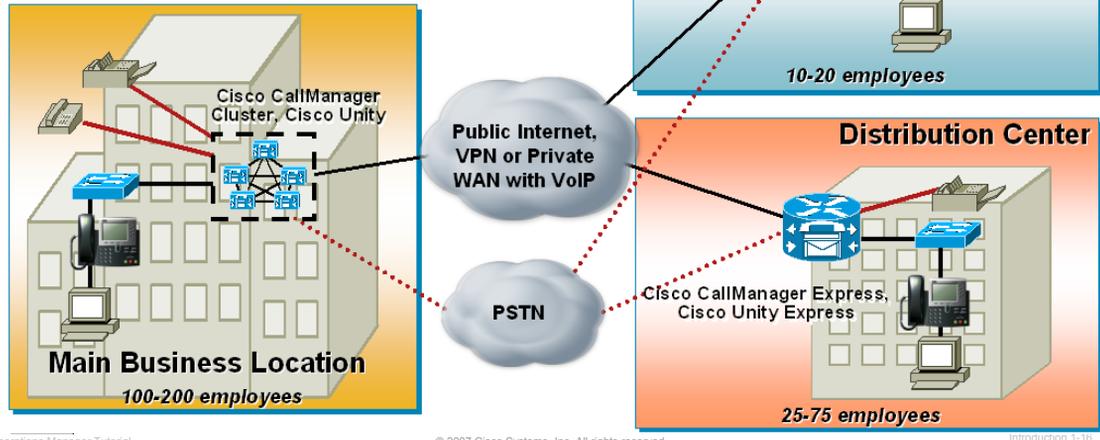
Businesses are constantly searching for methods to increase their effectiveness while attempting to cut costs. One cost savings step was the convergence of their voice, video, and data networks. Converged networks present businesses with a new communications paradigm, which has the potential to create new business efficiencies and increased employee productivity while cutting cost dramatically.

Cisco's AVVID (Architecture for Voice, Video, and Integrated Data) brings a standards-based open-architecture to multi-service networking. Cisco AVVID does away with the extremely inefficient disparate facilities for each application transport by allowing the enterprise network to converge over a common IP transport. Of course, the flexibility provided to voice and video solutions by AVVID also presents new management challenges for the network managers; namely the ability to ensure adequate availability and bandwidth for the mixed services now running over a single network.

# Managing Unified Communications

## The Complexity

- Growing number and complexity of devices, device types, and services
- Converged data types with different requirements sharing same transport
- Union of the people and processes that support the technologies
- Security – Implementation of AAA services



## The Complexity

Deployment of IP telephony is not simply a convergence of voice and data technologies, rather it is a convergence of the people and processes that support the technologies. To approach the challenge, companies often divide IP telephony into two components: the infrastructure and the services. One set of people and processes for each.

The converged infrastructure of components is ever growing. Now consisting of complex voice and data networking elements, new modules, new configurations for quality of service algorithms, and not to mention the IP phones themselves.

Through all the advances in technology, a network manager must never forget the importance of securing the services provided. Luckily, the same advanced security technologies that protect data networks can now protect converged networks carrying data, voice, and video traffic. Cisco recommends an integrated security policy to protect the integrity, privacy, and availability of a Cisco Unified Communications system. Integrating multiple layers of security technologies increases overall security by preventing a single configuration error or compromise from impacting the system. The three primary categories for securing the deployment are: network security, host security, and Authentication, Authorization, and Accounting (AAA) services.

(Links to more information on Unified Communications can be found in Chapter 5 of this tutorial.)

# Managing Unified Communications

## The Questions

- What device conditions lead to voice service degradation?
- What attributes should be polled or monitored to determine these conditions?
- How can the availability of critical voice services be ensured on a regular basis?
- How can the quality of voice be ascertained for active VoIP calls?



## The Questions

So the decision was made a long time ago to deploy IP telephony and now that has expanded to more than just voice calls over your IP network. Your role as a network manager is ever changing and now you are asking questions like these above.

So where does one begin to answer some of these questions? Let's take a further look.

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# Cisco's Solution

- Managing Unified Communications
- **Cisco's Solution**



# Cisco's Solution

## Unified Communications Management Suite

Empowering Customers to be More Efficient While  
Operating the Unified Communication System

Productivity



Simplification



Automation



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## Unified Communications Management Suite

The Cisco Unified Communications Management Suite is designed to work with the Cisco Unified Communication portfolio of products to improve productivity and reduce total cost of ownership through automation, integration, and simplification.

# Cisco's Solution Unified Operations Manager (OM)

Presents a comprehensive real-time view of the Unified Communications infrastructure including the operational status of each component...

The screenshot shows the Cisco Unified Operations Manager interface. At the top, it says 'Cisco Systems' and 'Cisco Unified Operations Manager'. Below that, it says 'A product from the Cisco Unified Communications Management Suite'. The main navigation bar includes 'Monitoring Dashboard', 'Diagnostics', 'Reports', 'Notifications', 'Devices', and 'Administration'. The breadcrumb trail shows 'You Are Here > Monitoring Dashboard'. The main content area is titled 'DASHBOARD VIEWS' and contains four panels:

- Service Level:** View of Unified Communications devices, applications, and IP phones and their connectivity and relationships.
- Alerts & Events:** View of alerts detected on devices and applications (no rules to write).
- Service Quality Alerts:** View of quality of voice alerts detected by Cisco 1040 sensors and CVTQ (Service Monitor).
- IP Phone Status:** View IP phones that have become unregistered, disconnected, or have gone into SRST mode.

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## Cisco Unified Operations Manager

Cisco Unified Operations Manager is part of the Cisco Unified Communications Management Suite. Operations Manager (OM) uses open interfaces and numerous types of diagnostic tests to continuously monitor and evaluate the current status of both the Unified Communications infrastructure and the underlying transport infrastructure of the network. Operations Manager does not deploy any agent software on the devices being monitored and thus is non-disruptive to system operations.

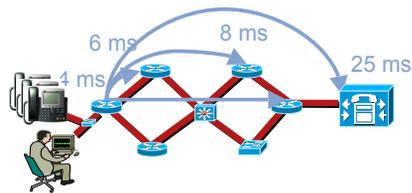
Information is presented by a series of 4 dashboards (representing different service-level views of the network), providing the network manager with a comprehensive view of the Unified Communications infrastructure and its current operational status.

The remaining chapters in this tutorial will look at each of these dashboard views (Chapter 2) and how to use these views in various scenarios (Chapter 3).

# Cisco's Solution Unified Operations Manager, (Cont.)

## Diagnostic Tests

- Replicate **end user activities** (end-to-end calls, phone registration, dial tone, conference, message waiting, emergency call)
- Replicate **protocol traffic** (IP SLA-based) to measure latency / Jitter / packet loss; Gateway registration



## Report Generation

- IP Phone and Device Inventory / Change Reports / Video enabled IP Phone reports
- Service Impact Reports
- Alert and Event History
- Personalized Reports
- Performance Reports (72 hr.)

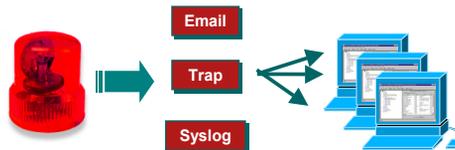
Cisco Unified Operations Manager  
All IP Phones/Lines as of Fri 17-Mar-2006 12:04:25 PST

Showing 1 - 20 of 54 records

	Extn.	User	IP Address	MAC Address	Model	Protocol	Regd.	CCM	CCM Name
1.	2211003	tom	172.20.4.29	001499a9542a	7970	SCCP	no	CME	ls-3845-cmeucv.cisco.com
2.	1001	tomth	192.168.159.203	003094c3cc6d	7960	SCCP	yes	CCM	rtngy-hq-com-pri.cisco.com
3.	2121002	Phone 7970 - P	172.20.4.118	00137f901f88	7970	SCCP	yes	CCM	ls-catal-2.cisco.com
4.	1003	Bill	192.168.159.205	000386711b1	7960	SCCP	yes	CCM	rtngy-hq-com-pri.cisco.com

## Notification Services

- Immediate notification of selected alerts using Email, SNMP traps, or Syslog messaging



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## Cisco Unified Operations Manager, (Cont.)

In addition to the Dashboard Views, Operations Manager has many other features that automate and simplify the network management tasks. These features include:

### Diagnostic Tests

Operations Manager comes with a rich set of diagnostic tests that can be used to aid in trouble isolation and resolution. There are primarily three types of tests: synthetic tests, phone status tests, and node-to-node IP SLA tests. The synthetic tests serve to replicate user activity (getting dial tone, making phone calls, leaving voice mail, and creating or joining conference calls). The phone status tests can be used to determine the current operational status of the IP phones in terms of signaling (SIP and SCCP) and IP connectivity. The node-to-node tests use the services of the Cisco IP Service Level Agent (IP SLA, formerly known as Service Assurance Agent [SAA]) in Cisco routers to simulate traffic in the network and then determine network characteristics such as reachability status, response time, latency, jitter, packet loss, and network quality.

### Report Generation

Operations Manager provides an extensive set of reports that help network managers maintain information about their Cisco Unified Communications deployment. The historical alert, event, and service-quality reports maintain information about all the alerts and events reported by Operations Manager for up to 30 days. This enables network managers to document any past outage and have access to it for long-term trending purposes.

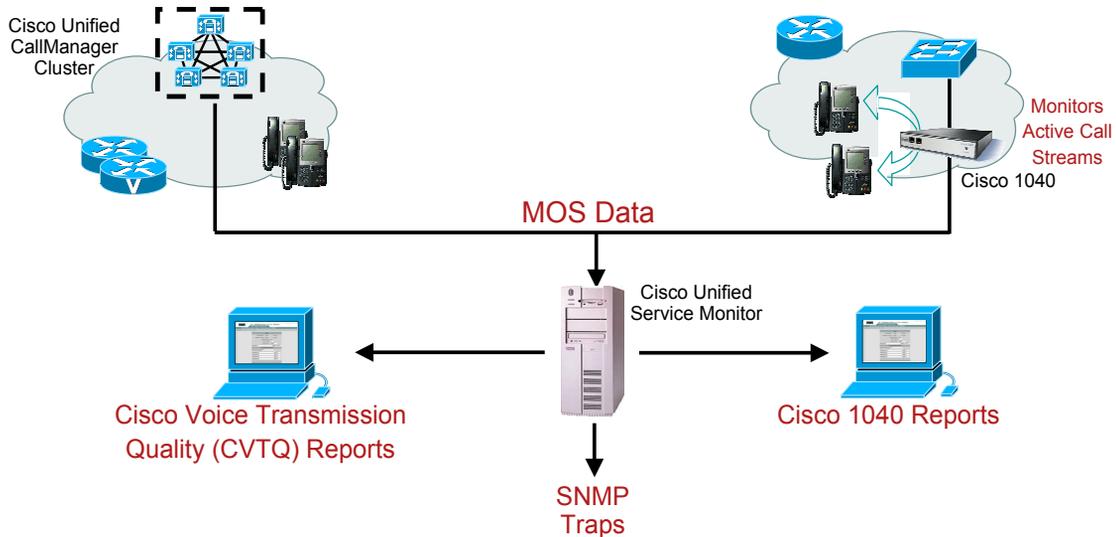
### Notification Services

Operations Manager allows the administrator to notify end-users based on type of event for a given subset of devices. The notification can be in the form of an email, Syslog message, or SNMP trap.

# Cisco's Solution

## Unified Service Monitor (SM) / Cisco 1040 Sensors

**Service Monitor** manages Cisco 1040 sensors and analyzes and reports on voice quality using Mean Opinion Scores (**MOS**) received from Cisco Unified CallManager clusters and the Cisco 1040 sensors



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## Cisco Unified Service Monitor / Cisco 1040 Sensors

Cisco Unified Service Monitor is another application in the Cisco Unified Communications Management Suite. Service Monitor (SM), Cisco 1040 sensors, and the Cisco Unified CallManager clusters provide a reliable method of monitoring and evaluating voice quality for IP phones. The Cisco 1040 sensor continuously monitors active calls supported by the Cisco Unified Communications system. Cisco Unified CallManagers store MOS values for calls that are calculated on gateways and phones using the Cisco Voice Transmission Quality (CVTQ) algorithm. The Service Monitor gathers the MOS statistics from the sensors and CallManagers and provides near-real-time notification when the voice quality of a call fails to meet a user-defined quality threshold.

Below is a brief description of the Cisco Unified Service Monitor components:

- **Cisco 1040 Sensor** – A hardware appliance or probe used to monitor quality of voice for up to 80 active RTP streams. The call quality is calculated using the ITU G107 R-factor algorithm and converted into a Mean Opinion Score (MOS). The sensor then forwards a quality of voice metric (MOS) for each monitored stream every 60 seconds to the Service Monitor server.
- **Service Monitor**– Compares the quality of voice metrics incoming from the Cisco 1040 sensors and managed Cisco CallManagers to user-defined thresholds. If a threshold violation is detected, Service Monitor will forward a SNMP trap containing the pertinent information to up to four trap recipients. Service Monitor can also optionally archive all incoming metrics, and is used to manage the configuration and image files for the Cisco 1040 sensors.

(Refer to the Cisco Unified Service Monitor Tutorial and Chapter 5 of this tutorial for more information on Service Monitor and the Cisco 1040 Sensors.)



# Cisco's Solution

## Product Compatibility

Cisco Unified Communications Operations Manager and Cisco Unified Communications Service Monitor supports deployments consisting of:

- Cisco CallManager
- Cisco CallManager Express
- Cisco Unity
- Cisco Unity Express
- Cisco Meeting Place Express
- Cisco Conference Connection
- Cisco Unified Presence Server
- Cisco Unity Connection
- Cisco Unified Contact Center
- Cisco Unified Contact Center Express
- Cisco Telepresence Stations (CTS series)
- Cisco Emergency Responder
- Cisco Personal Assistant
- Routers, Gateways, Switches, IP Phones, and Video Phones



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## Product Compatibility

The Cisco Unified Communications Management Suite is compatible with the Unified Communications products highlighted above.



**Thank You!**

Continue on to Chapter 2 to discover the many features of Operations Manager.

Cisco Systems



# Cisco Unified Operations Manager

## Product Features

### Chapter 2



# Chapter 2 Outline

## Operations Manager Product Features

- Operational Status Views
- Diagnostic Tests
- Inventory Management
- Reports
- Event Notification
- Customization / Advanced Features



## Chapter 2 Outline

Hopefully Chapter 1 has excited you to the possibilities of using Operations Manager to help manage your Unified Communications devices and services. This chapter discusses the key features and services provided by Unified Operations Manager (OM).

By the conclusion of this chapter, the reader should have a good understanding of the services provided by Operations Manager. Chapter 3 will then provide the jump start to using Operations Manager through a series of scenarios that detail some common network management situations.



# Operational Status Views

- **Operational Status Views**
- Diagnostic Tests
- Inventory Management
- Reports
- Event Notification
- Customization / Advanced Features



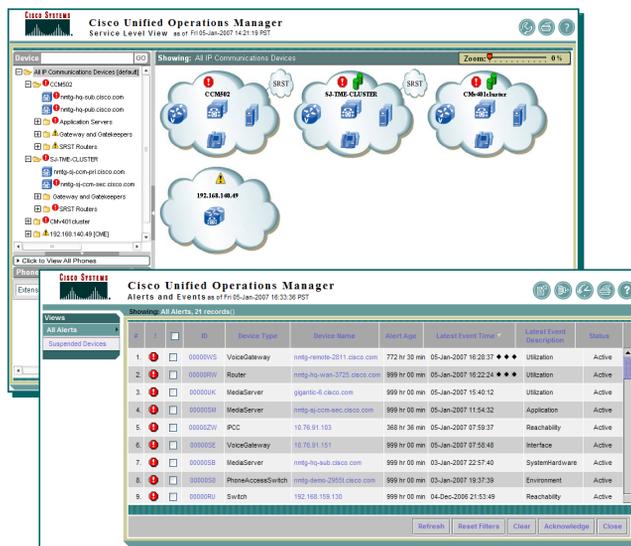
# Operational Status Views Overview

## Dashboards (4)

- Service Level View
- Alerts and Events
- Service Quality Alerts
- IP Phone Status

## Views in Dashboards

- Device Groups limit / control the amount of information in a view
- Default Views (2)
  - All Alerts
  - Suspended Devices
- Customize Views - Select the devices seen in a view
- Filter controls - Limit devices seen in a view



**Tip:** All dashboards can be bookmarked in browser for quick access

## Operational Status Views – Overview

Operations Manager provides you with four monitoring dashboards: Service Level View, Alerts and Events, Service Quality Alerts, and IP Phone Status. The launch point to these dashboards are the first screen that the user will see when launching Operations Manager. On a day-to-day basis, operations personnel are likely to use these monitoring dashboard displays to monitor the Unified Communications environment. Network administrators and operators might similarly use the monitoring dashboard displays and Alert and Event History reports to assess network health and the IP phone reports to solve IP phone problems.

Because the Unified Communications network can be large, organization of information is key to network management. Thus, “Views” are used within Operations Manager to organize or limit and control the amount of information displayed at one time. Views are logical groupings of devices that appear in the Monitoring Dashboard displays. By default, the Alerts and Events, Phone Activities, and Service Quality Alerts displays contain two default views: **All Alerts** and **Suspended Devices**. These views are static and cannot be edited, deactivated, or deleted. The Service Level View display contains the **All IP Communications Devices** view, which is a default view that cannot be edited, deactivated, or deleted. Once you decide how you want to cluster your devices into a logical set, you can create and activate a view of these groups so they are shown in the Monitoring Dashboard displays.

Even a view can have a wealth of information. Thus, filter controls are available within the Monitoring Dashboards to further limit the information displayed or can help you locate the information that you are looking for. (An example of creating new views is illustrated in Chapter 3, Scenarios.)

Now, let’s look at the content within each of these Monitoring Dashboards!

# Operational Status Views

## Service Level View Dashboard

CiscoWorks | Logout | Help | About

**Cisco Unified Operations Manager**  
A product from the **Cisco Unified Communications Management Suite**

Monitoring Dashboard | Diagnostics | Reports | Notifications | Devices | Administration

▼ Service Level View | Alerts and Events | Service Quality Alerts | IP Phone Status | All IP Phones/Lines | Manage Views

You Are Here ► Monitoring Dashboard

**Launch Service Level View**

**Service Level View**  
Current status of various devices, applications, and phones, and the connectivity and relationships among them.

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

**Service Quality Alerts**  
Current alerts and issues regarding service quality in the IP telephony services.  
▶ Click to launch Service Monitor

**IP Phone Status**  
List of IP phones that are experiencing outages in service.  
▶ Click to View All Phones

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Features 2-5

## Service Level View Dashboard

One of the four Monitoring Dashboards in Operations Manager is the **Service Level View**. This view allows network managers to visualize their Unified Communications deployment. This view is a real-time auto-refresh display that provides summary and status information about all the Unified Communications clusters and the elements of the clusters in the deployment. The view displays a logical topology view of your Unified Communications implementation and focuses on the call control relationships.

The Service Level View is accessible under the Operations Manager Monitoring Dashboard tab. Either select the menu under the Monitoring Dashboard tab or click on the **Service Level View** picture (*notice that the icon changes when the cursor is placed over the top of it*).

# Service Level View Dashboard Overview

The screenshot shows the Cisco Unified Operations Manager Service Level View interface. At the top, it displays the Cisco logo, the product name, and the current time. A status bar indicates 'Display automatically refreshes'. The main area shows a logical topology of CCM clusters (CCM502, SJ-TME-CLUSTER, CCM40-Cluster) and their associated devices. A left sidebar contains a tree view of the network hierarchy. A bottom section displays a table of alerts and a summary of phone counts.

**Views**

- Tree View or Map View
- View IP Telephony Clusters or create your own custom device views

**Remote Devices**

**Top level map view shows all discovered CCM Clusters**

**CCM Cluster Database Replication Status (green / red)**

**IP Phone Count**

**Cluster Count**

**Phone Search Area**

- Click to view all phones
- Search for phone(s) by Ext. MAC or IP address – Phones displayed in window

**Alerts**

- Most Recent (3)
- View All

Device Name	Latest Event Time	Event Description	Alert Count	Summary
192.168.137.89	05-Jan-2007 14:05:20	Utilization	Critical 6	Registered Phone Count: 13
austincm3.cisco		Utilization	Warning 3	Unregistered Phone Count: 6
tme-gw.cisco.co		Utilization	Informational 0	Total Device Count: 13
<b>Total Count:</b>			<b>9</b>	<b>Number of Clusters:</b> 4

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## Service Level View – Dashboard Overview

Cisco Unified Operations Manager's Service Level View display a logical topology view and allows network managers to visualize their entire Cisco Unified Communications deployment.

This logical view focuses on call control relationships. The Service Level View shows all the Cisco Unified CallManager clusters and all route groups and route lists in the clusters; all instances of Cisco Unified CallManager Express (and their logical groupings); associated gateways, gatekeepers, application servers, and Cisco IP Contact Centers (and their logical groupings); and SRST-enabled devices; as well as each component's registration status with Cisco Unified CallManager.

The Service Level View is designed so that it can be setup and left running, providing an ongoing monitoring tool that signals you when something needs attention. When a fault occurs in the network, Operations Manager generates an event or events that are rolled up into an alert. If the alert occurs on an element it is shown on the Service Level View.

The Service Level View is a tree based and map based display. It displays all the IP Telephony clusters present in your network. The display uses views (a logical grouping of device groups) to organize what you want to see. There is one default view called **All IP Communications Devices** and your own views can also be created. The **All IP Communications Devices** view contains all the Cisco CallManager clusters and all the devices associated with the clusters in your network.

You can use the Service Level View to:

- Display a logical or neighbor topology view of your Unified Communications deployment
- View most recent alerts, severity levels, and historical view
- Launch other Operations Manager tools
- Depending on the device type, launch other tools outside of Operations Manager or administration pages for devices, such as CCM Administration or Serviceability pages, Unity Administration, or Gateway Administration
- View IP Phone count (registered or unregistered), device count, and CCM count in the Summary view
- View latest changes
- Drill down into CCM cluster to view service level topology (next page)

# Service Level View Dashboard

## Device Group or Cluster Details

The screenshot shows the Cisco Unified Operations Manager interface. The left pane displays a tree view of devices and clusters. The main pane shows a network topology with various devices and their interconnections. Annotations highlight key features: 'Devices within a CCM Cluster or View' points to the left pane; 'Alert(s) on device' points to a red exclamation mark on a device; 'Not reachable' points to a device with a red 'X'; 'Right-click on device to bring up tools menu for device' points to a context menu; 'Alert Count and Summary relative to selected View' points to a summary table at the bottom right. A right-click menu is also shown with options like 'Alert History', 'Alert Details', 'Associated Phones', etc.

Most Recent Alerts		Alert Count		Summary	
Device Name	Event Description	Severity	Count	Category	Count
172.20.118.82	Other	Critical	3	Registered Phone Count	1
172.20.118.83	Other	Warning	0	Unregistered Phone Count	0
1-skate-7845h.cisco.com	SystemHardware	Informational	0	<b>Total Device Count</b>	<b>7</b>
		<b>Total Count</b>	<b>3</b>	<b>Number of Call Managers</b>	<b>2</b>

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Features 2-7

## Service Level View – Device Group or Cluster Details

Drill down views show the operational status of each element of the Unified Communications cluster and its interrelationships with other elements. This display serves as the central point to initiate different functions that are available in Operations Manager.

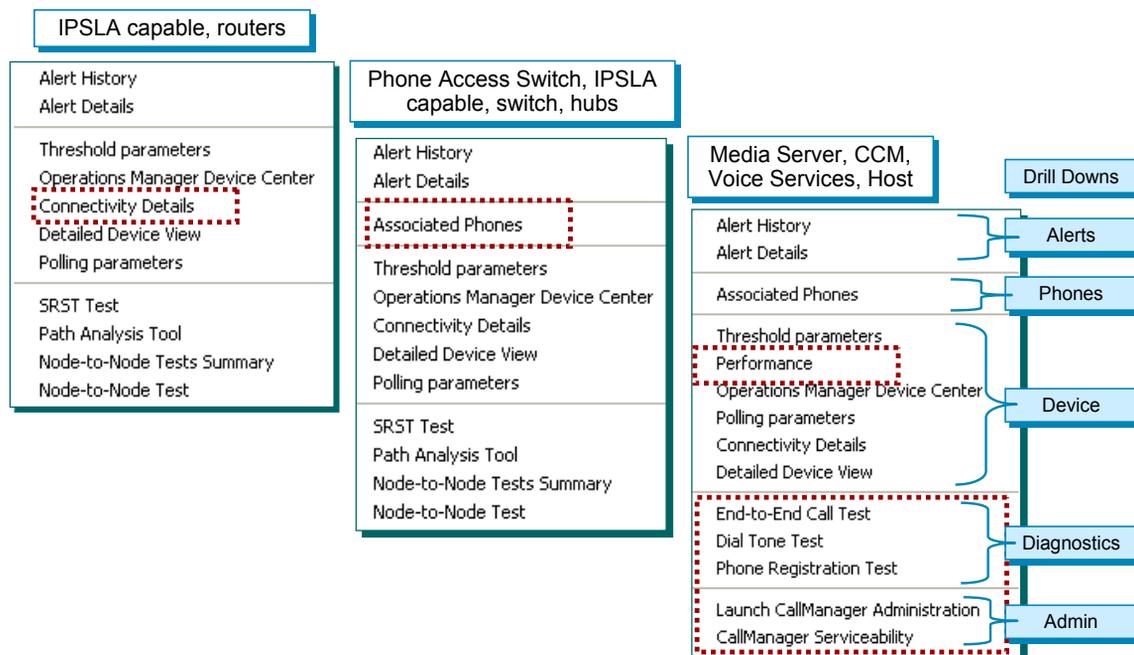
A context-sensitive right-click menu is provided through which network managers can get detailed status as well as historical information about the alerts on each of the elements.

It is also possible to select different devices and initiate a variety of diagnostic tests, get access to performance-monitoring and capacity-monitoring information by way of graphs, or get IP connectivity details for a device by launching a neighbor topology view that shows Layer 2 physical connectivity for up to five hops from the selected device.

Operations Manager also makes available a set of context-sensitive tools outside of Operations Manager that can aid in further troubleshooting or diagnostics. The figure above shows the Service Level view for a multi-cluster Unified Communications deployment and its drill down details.

# Service Level View Dashboard

## Drill Downs Based on Device Capabilities



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Features 2-8

## Service Level View – Drill Downs

Drill downs provide the next step for the user to take and are a great way to view more information or easily launch other tools on a selected device. For example, let's say a device is marked with a critical alerts in the Service Level View. By simply using the right mouse click on the device, the user is presented with available drill downs for more information (i.e. Look at the alert details, run a diagnostic test, or generate a report).

A context-sensitive right-click menu is provided as access to these drill down menus. The reports and tools available for selection differ based on the device selected. Operations Manager provides the appropriate drill down capabilities by first evaluating the device type and its capabilities. Illustrated above are different drill downs for various devices. The available drill down types are illustrated below. Remember, not all drill downs are applicable to every device; it will depend upon the device capabilities and services installed on the device.

- Alert
  - Alert Details
  - Alert History
- Device
  - Detail Device View
  - Performance, Polling, Thresholds
  - Connectivity Details (Physical Topology)
- IP Phone
  - Associated IP Phones
- Diagnostic Tests
  - Synthetic (End-to-End Call, Dial Tone, Phone Registration)
  - IP SLA (Node-to-Node)
  - SRST
- Administration (Cisco CallManager Administration / Serviceability)
- Other tools
  - Common Services
  - CiscoWorks Device Center



# Service Level View Dashboard

## Route List Report

Operations Manager displays route lists and route groups for Cisco Unified CallManager version 4.0 and later



**Route List Cloud**  
 Number of Route Lists: 3  
 No of RouteLists Down: 0

**Cisco Unified Operations Manager**  
 Route List Report for Cluster: SJ-TME-CLUSTER as of Fri 05-Jan-2007 14:54:47 PST

Showing 3 Route List(s)

	Name	Alert Status	Status	Route Pattern	Utilization %	DNS Name	IP Address	Protocol	CCM	Tools
	RtList-CME	---		-	-					-- Select --
	RtList-Remote	---		-	-					-- Select --
	RtGrp-2	---		-	-					-- Select --
	192.168.159.203			-	-	192.168.137.89	192.168.159.203	H323	nmg-sj-cm-sec.cisco.com	-- Select --
	RtList-Branch	---		-	-					-- Select -- Performance SRST Test Operations Manager Device Center Node-to-Node Tests Summary Alert History Alert Details Polling Parameters Poll Parameters Analysis Tool Config Details Device View Gateway Administration Associated SRST Phones Node-to-Node Test Network Analysis Module

Click

To view Route List report, Cluster Voice Utilization Polling parameters must be enabled (Note: Disabled by default, see lesson 8 for details on how to enable)

Context sensitive tool launch

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## Service Level View – Route List Report

A Route List Cloud icon can be seen in the Service Level View. To generate a route list report, click the Route List Cloud icon in the view. The leftmost column contains various icons:

- Route List--Expand to view the route groups in the route list
- Route Group--Expand to view the gateways in the route group
- Voice Gateway--View the data for the gateway

The route pattern field describes the route pattern that is associated with the route list. It comprises one or more digits and wildcards (such as X which indicates a single digit) that represent a range of directory numbers that are either routed or blocked by the pattern.

The utilization field has either one of the following:

- Percentage utilization for the route list, route group, or gateway. Note: For Operations Manager to obtain this data, polling for Cluster Utilization Settings must be enabled; it is disabled by default.
- N/A or dash (-)-move cursor over this column to view a tool tip with an explanation.

Note(s):

- Operations Manager displays route lists and route groups for Cisco Unified CallManager version 4.0 and later.
- For Operations Manager to obtain utilization data or route group data, polling for Cluster Utilization Settings must be enabled; it is disabled by default. To enable this setting, use **Administration> Polling and Thresholds**.

# Service Level View Dashboard

## Physical Relationships

**Name:** 192.168.140.49  
**IP Address:** 192.168.140.49  
**Capability:** [VoiceGateway, CallManager, Express, VoiceServices, IPSLA, H323, Router, Routers]  
**Status:** Monitored

**Right-Mouse Click**  
Provides launch point for many tools and settings

**Threshold parameters**  
Performance  
Operations Manager Device Center  
Polling parameters  
**Connectivity Details**  
Detailed Device View

Connectivity details obtained using SNMP and retrieving the CDP tables of its neighbors up to the specified hop count

Set hop count from 1-5 (3 is default)

Gray devices are not managed

Solid Lines Physically Connected

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Features 2-11

## Service Level View – Physical Relationships

The Service Level View can also be used to illustrate physical device connectivity. Simply select a device that you want to view, right-mouse click, and select **Connectivity Details**.

The physical connectivity is obtained by using the access credentials (SNMP) defined in Operations Manager to retrieve the CDP (Cisco Discovery Protocol) table, containing port connectivity to neighboring devices. Once the neighbor device is known, its neighbors can be retrieved, if CDP is enabled and the access credentials allow to information to be viewed. If CDP is enabled on its neighboring devices, this continues up to the defined **Hop Count**, illustrated above. You can change the number of hops you want displayed (between one and five).

Operations Manager will gray-out devices that it is not communicating with; therefore, the devices could not be managed. This could occur due to the following:

- The device is not responding to OM using SNMP queries. The credentials either don't match between OM and the device, SNMP is not enabled on the device, or the protocol may be blocked by a firewall.
- The device is outside the discovery boundaries. The device could have been discovered originally from the CCM discovery.

# Service Level View Dashboard Associated IP Phones

**Right-Mouse Click**  
Provides launch point for many tools and settings

**Associated Phones**

- Threshold parameters
- Performance
- Operations Manager Device Center
- Polling parameters
- Connectivity Details
- Detailed Device View
- End-to-end Call Test
- Dial Tone Test
- Phone Registration Test

**Column Selector**

Hidden Column(s): Protocol, CCM/CME Name, CCM, Switch Name, Port Status, VLAN Name, VLAN ID, SRST mode, SRST Router, Serial No.

Displayed Column(s): CCM/CME Address, Extn., IP Address, MAC Address, Model, Port, Regd., Switch Address, User

**Cisco Unified Operations Manager**  
Associated Phones for CCM : 192.168.137.4 as of Wed 10-Jan-2007 09:55:17 PST

Showing 1 - 3 of 3 records

	Extn.	User	IP Address	MAC Address	Model	Regd.	CCM/CME Address	Switch Address	Port
1.	1021	Auto 1021	192.168.137.5	00036b7fff1	7960	yes	192.168.137.4	192.168.137.24	Fa1/0/21
2.	1024	Auto 1024	192.168.137.8	00036be7b3df	7960	yes	192.168.137.4	192.168.137.24	Fa1/0/19
3.	1025	Auto 1025	192.168.137.9	0003e3340785	7960	yes	192.168.137.4	192.168.137.24	Fa1/0/20

Rows per page: 20

Go to page: 1 of 1 Pages

Select data to display

Select an item then take an action -->

Provides launch point for running diagnostic test on a selected phone

Launch

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## Service Level View – Associated IP Phones

The Service Level View can also be used to display IP Phones associated with a selected Cisco CallManager. Simply select a CallManager that you want to view, right-mouse click, and select **Associated Phones**.

**Tip:** You can also get a report on *ALL* IP phones in several ways: The “**Click to View All IP Phones**” button on either the OM Home Page or the Service Level View dashboard (lower left corner; you may need to expand view), or from the OM Home Page, **Monitoring Dashboard> All IP Phones / Lines** menu.

As illustrated above, information such as the phone’s extension, registered user, IP and MAC addresses, protocol, and associated CallManager can be obtained. If the phone is also connected to a managed switch that information is also provided.

### Note(s):

- The user name is available using one of two ways:
  - Using LDAP and a LDAP server is configured / defined in Operations Manager. (Chapter 3 describes how to configure a LDAP server in Operations Manager.)
  - Or, when a description for the phone has been entered in CCM
  - If both ways are available, LDAP takes precedence.
- The protocol illustrated is the protocol used between the phone and CCM.
- Registration status of the IP phone is with respect to Cisco CallManager or Cisco CallManager Express. The field displays **yes** if the IP phone is registered or **no** if the IP phone is not registered.
- SRST (Secure Survivable Remote Site Telephony) fields provide information if the phone is configured to fail over to an SRST router in case of a WAN link failure.
- The launch point links can be used to quickly configure diagnostics tests (SRST test, Synthetic Test, IP Phone Status Test) on a selected phone. More information on these tests is available in the Diagnostics Testing section of this chapter.

# Service Level View Performance Drill Down

**Right-Mouse Click**  
Provides launch point for many tools and settings

**Name:** nmtg-remote-2811.cisco.com  
**IP Address:** 192.168.159.203  
**Capability:** [VoiceGateway, SRST  
**Enabled Router, IPSLA, H323, Router, Routers, SRST]**  
**Status:** Monitored

**Associated Phones**  
**Threshold parameters**  
**Performance**  
Operations Manager Device Center  
Polling parameters  
Connectivity Details  
Detailed Device View

End-to-End Call Test  
Dial Tone Test  
Phone Registration Test

**Select Metrics**

Metric Name	
<input type="checkbox"/>	Minutes in SRST mode (Number)
<input checked="" type="checkbox"/>	CPU 1 last 1 minute Usage (Percentage)
<input checked="" type="checkbox"/>	Processor memory Usage (Percentage)
<input type="checkbox"/>	VO memory Usage (Percentage)
<input type="checkbox"/>	Active call legs (Number)
<input type="checkbox"/>	FXS Port Utilization (Percentage)
<input type="checkbox"/>	FXO Port Utilization (Percentage)
<input type="checkbox"/>	EM Port Utilization (Percentage)
<input type="checkbox"/>	BRI Channel Utilization (Percentage)
<input type="checkbox"/>	T1 CAS Channel Utilization (Percentage)
<input type="checkbox"/>	E1 CAS Channel Utilization (Percentage)
<input type="checkbox"/>	T1 PRI Channel Utilization (Percentage)
<input type="checkbox"/>	E1 PRI Channel Utilization (Percentage)
<input type="checkbox"/>	DSP Utilization (Percentage)

**Graphing Metrics are device specific**

**To view device Performance, the Voice Utilization Polling parameters must be enabled (Note: Disabled by default, see lesson 8 for details on how to enable)**

**View Graph** **Help** **Cancel**

**Next Slide**

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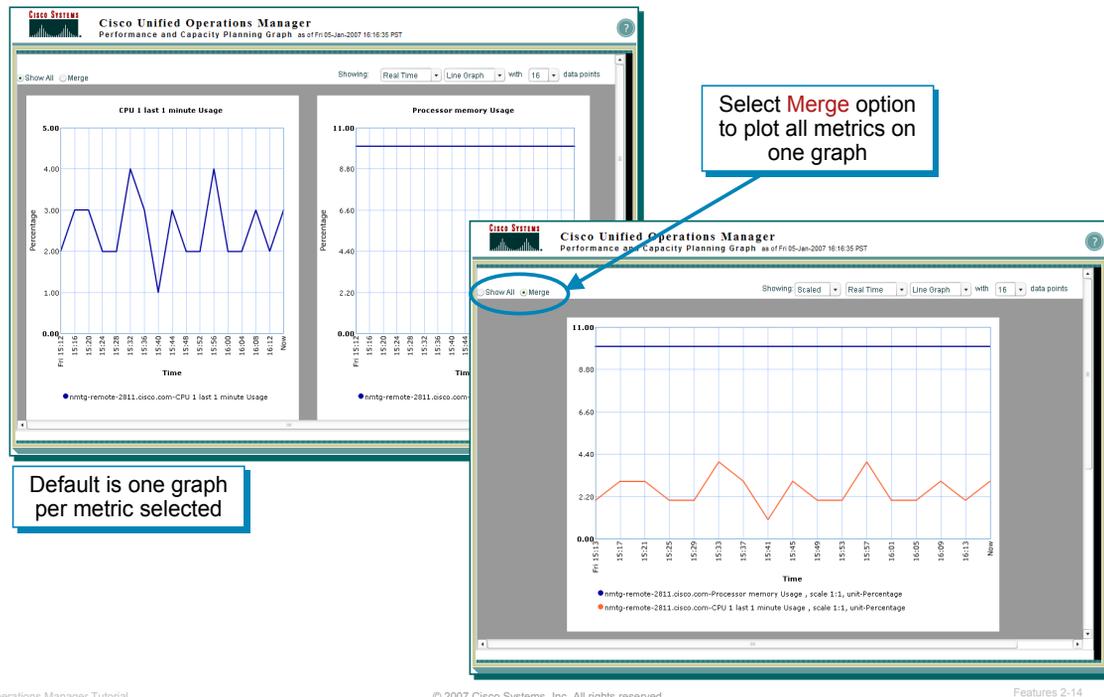
Features 2-13

## Service Level View – Performance Drill Down

A user can select a device and examine changes in network performance metrics. The network performance data can be selected, displayed, and charted in real time. Performance graphs can be created from the data that is collected when either:

- Voice utilization polling is enabled for devices. Voice utilization polling is disabled by default. To enable this setting, use **Administration> Polling and Thresholds**.
- Data is available on disk from node-to-node tests that you have configured.

# Service Level View Performance Graph



## Service Level View – Performance Graph

Performance graphs provide real-time information and historical information. When you launch a performance graph, one line graph is displayed for each metric that you select. Each line graph contains 16 data points displayed in real time.

The graph menus allow you to change the display:

- Time line: Real Time (default) or select the number of hours of data to graph, up to a maximum of 72 hours. If you select a device that does not have data available for the selected time interval, a message appears stating such. An empty graph appears and refreshes periodically automatically. At any time, you can change the time interval to get historical information, if there is any.
- Graph Type: Line Graphs (default) or select Bar Chart or Area Chart.
- Data Points: 16 data points (default) or select up to a maximum of 240 data points.

Additionally, you can **show all graphs or merge all graphs** regardless of the unit of measure. When you select the **Merge** radio button, the merged graph is scaled to show all the metrics in the single graph.

# Service Level View

## Performance Graphing Multiple Devices

Showing: All IP Communications Devices > CCM502      Zoom: 0%

Click one device, hold the Ctrl key, click another device and then right-click and select **Performance**

Context Menu:

- Delete Device
- Group Devices
- Suspend Device
- Connectivity Details
- Performance
- Settings...
- About Adobe Flash Player 9...

Select Metrics Panel:

Metric Name	Selected
Active Calls (Number)	<input type="checkbox"/>
Total CPU Usage (Percentage)	<input checked="" type="checkbox"/>
Memory Usage (Percentage)	<input checked="" type="checkbox"/>
FXS Ports In Service (Number)	<input type="checkbox"/>
FXS Port Utilization (Percentage)	<input type="checkbox"/>
FXO Ports In Service (Number)	<input type="checkbox"/>
FXO Port Utilization (Percentage)	<input type="checkbox"/>
BRI Channel Utilization (Percentage)	<input type="checkbox"/>
T1 CAS Channel Utilization (Percentage)	<input type="checkbox"/>
T1 PRI Channel Utilization (Percentage)	<input type="checkbox"/>
E1 PRI Channel Utilization (Percentage)	<input type="checkbox"/>
CTI Links Active (Number)	<input type="checkbox"/>
MOH Multicast Resource Utilization (Percentage)	<input type="checkbox"/>
MOH Unicast Resource Utilization (Percentage)	<input type="checkbox"/>
MTP Resource Available (Number)	<input type="checkbox"/>
MTP Resource Utilization (Percentage)	<input type="checkbox"/>
Transcoder Resource Available (Number)	<input type="checkbox"/>
Transcoder Resource Utilization (Percentage)	<input type="checkbox"/>
Hardware Conference Resource Available (Number)	<input type="checkbox"/>
Hardware Conference Resource Utilization (Percentage)	<input type="checkbox"/>
Software Conference Resource Available (Number)	<input type="checkbox"/>
Software Conference Resource Utilization (Percentage)	<input type="checkbox"/>
Percentage Conferences Active (Percentage)	<input type="checkbox"/>
Percentage Conference Streams Active (Percentage)	<input type="checkbox"/>
Percentage MOH Streams Active (Percentage)	<input type="checkbox"/>
Percentage MTP Streams Active (Percentage)	<input type="checkbox"/>
Registered Analog Access (Number)	<input type="checkbox"/>
Registered MGCP Gateways (Number)	<input type="checkbox"/>
Registered Hardware Phones (Number)	<input type="checkbox"/>

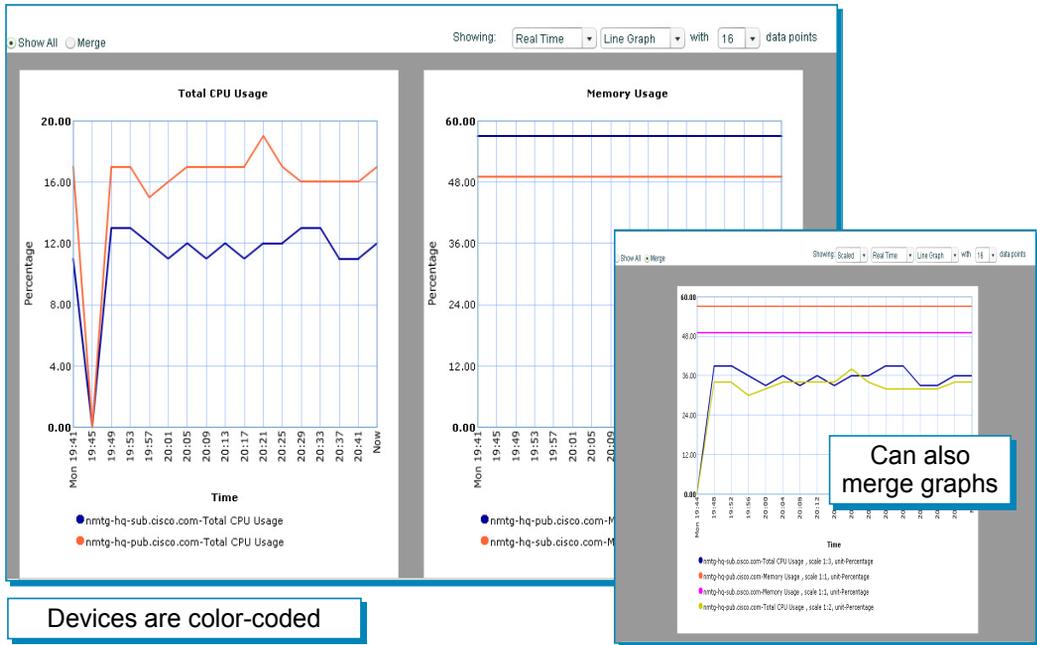
View Graph      **Next Slide**

## Service Level View – Performance Graphing Multiple Devices

To graph data for more than one device together, click one device, hold the Ctrl key, click another device, and then right-click and select **Performance** from the menu. Let's look at an example on the next page.

# Service Level View

## Multiple Devices Performance Graph



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Features 2-16

## Service Level View – Multiple Devices Performance Graph

Above is an example of the network performance data graphed for multiple devices.

# Operational Status Views

## Alerts and Events Dashboard

Cisco Systems

Cisco Unified Operations Manager  
A product from the Cisco Unified Communications Management Suite

Monitoring Dashboard | Diagnostics | Reports | Notifications | Devices | Administration

Service Level View | Alerts and Events | Service Quality Alerts | IP Phone Status | All IP Phones/Lines | Manage Views

You Are Here • Monitoring Dashboard

Launch Alerts and Events View

**Service Level View**  
Current status of various devices, applications, and phones, and the connectivity and relationships among them.

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

**Service Quality Alerts**  
Current alerts and issues regarding service quality in the IP telephony services.  
Click to launch Service Monitor

**IP Phone Status**  
List of IP phones that are experiencing outages in service.  
Click to View All Phones

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Features 2-17

## Alerts and Events View Dashboard

The second of the four Monitoring Dashboards in Operations Manager is the **Alerts and Events** View. This view provides real-time information about the operational status of your network.

The view is accessible under the Operations Manager Monitoring Dashboard tab. Either select the menu under the Monitoring Dashboard tab or click on the **Alerts and Events** picture (notice that the icon changes when the cursor is placed over the top of it).

# Alerts and Events Dashboard Overview

## Alert and Events View

A device is monitored for many conditions. When one or more of these conditions is problematic, a single alert on the device is displayed in the Alert and Events View.

**Cisco Unified Operations Manager**  
Alerts and Events as of Fri 05-Jan-2007 16:33:36 PST

Showing: All Alerts, 21 records()

#	!	ID	Device Type	Device Name	Alert Age	Latest Event Time	Latest Event Description	Status
1.	!	00000WS	VoiceGateway	nm1g-remote-2811.cisco.com	772 hr 30 min	05-Jan-2007 16:28:37	Utilization	Active
2.	!	00000RW	Router	nm1g-hq-wan-3725.cisco.com	999 hr 00 min	05-Jan-2007 16:22:24		Active
3.	!	00000UK	MediaServer	gigantic-6.cisco.com	999 hr 00 min	05-Jan-2007 15:40:12		Active
4.	!	00000SM	MediaServer	nm1g-sj-ccm-sec.cisco.com	999			Active
5.	!	00000ZV	IPCC	10.76.91.103	368			Active
6.	!	00000SE	VoiceGateway	10.76.91.151	999 hr 00 min	05-Jan-2007 07:58:48	Interface	Active
7.	!	00000SB	Med				SystemHardware	Active
8.	!	00000SD	Phon				Reachability	Active
9.	!	00000RU	Sw					Active

Views: All Alerts, Suspended Devices

Alerts can be organized by Views (groups of devices) that can be customized

Severity of Alert

Clear or Acknowledge Alerts

Click Device Name to obtain detailed device information

One Alert is displayed per device. An alert can be made up of 1 or more events. Click Alert ID to obtain details on the cause for the alert!

Diamonds fade away as alert activity become stale

Alert Details

Refresh Reset Filters Clear Acknowledge Close

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Features 2-18

## Alerts and Events – Dashboard Overview

The **Alerts and Events** view is illustrated above. These alerts are per device and are caused by one or more events detected by monitoring the device with Operations Manager. Operations Manager comes with built-in intelligence that can understand the role of every device in an IP deployment, and it appropriately monitors those devices for any kind of faults or outages. There is no need to write any rules to start monitoring the Unified Communications deployment; all the rules are built into the product. It also comes with factory-defined thresholds (which can be further tuned by network administrators) and an analysis engine that can detect the violation of any of these thresholds and immediately alert network managers through multiple means.

Alerts are presented to the user through the Alerts and Events Display, which refreshes periodically to present the most up-to-date status of the Unified Communications deployment being monitored. A separate display called the IP Phone Status Display, discussed later in this section, provides instant access to IP phone outage information.

The display is designed so that you can have Alert views for all devices or customized device groups (views), providing an ongoing monitoring tool that signals you when something needs attention. (*Creating customized device views is discussed later in this chapter.*)

When a condition occurs in the network (i.e. monitored parameters exceed a threshold or a service/interface is down), Operations Manager generates an event, and events for a single device are rolled up into an alert on the device. If the alert occurs on an element in your active view (a logical grouping of device groups), it is shown on the Alerts and Events display.

To view the event(s) that triggered an alert on the device, simply click the **Alert ID**.

### Note(s):

- For a device to be monitored by Operations Manager, it must be supported by Operations Manager and added to the OM Inventory (refer to the Device Management section discussed later).

# Alerts and Events Dashboard Legend

Severity of Alert	Last Change
 - Critical	◆◆◆ - Alert updated within last 15 minutes
 - Warning	◆◆ - Alert updated within last 16 - 30 minutes
 - Informational Unidentified Trap	◆ - Alert updated within last 31 - 45 minutes
No Icon - Informational	No Diamonds - Alert was updated over 46 minutes ago

 - Export current tabular display to a PDF file	 - Opens printer friendly version of display	 - Opens Alert History Report (last 24 hours)
 - Opens the filter page for limiting the alerts displayed	 - Opens Help window	

## Alerts and Events - Dashboard Legend

As shown in the graphic above, the Alerts and Events display uses icons as a means of quick glance status (severity and Last Change), and as launch points for additional tools.

### Note(s):

- The diamond symbols in the **Last Change** column indicate which alerts have experienced recent activity. When no icon appears in the Last Change column, the alert is older than 45 minutes. The Status field will indicate if the alert is still active or otherwise.

# Alerts and Events Dashboard

## Alert Details

**Alert Details**  
(Alert ID selected on dashboard)  
Illustrates the conditions / events that caused the alert

**Tools**  
Additional resources to help troubleshoot the event

Select to see actual details

View history on this event

- **Annotate** - Document notes on the event
- **Acknowledge** - Inform other users (all Alert and Event displays) that you are aware of alert and change status to Acknowledge. Alert is made active again if condition recurs
- **Clear** - Clearing an alert clears all events and changes status to Cleared; Alert is lowered to the bottom in the Alerts Display list. (Clearing a single event does not clear the alert, unless all events are cleared.)
- **Suspend** - OM will stop monitoring the device
- **Notify** - Send an email message

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Features 2-20

## Alerts and Events –Alert Details

Upon selecting the **Alert ID** in the Alerts and Events view, the event(s) which triggered an alert on the device is/are listed. The events with the most recent change are listed first.

Events remain in the Alert Details report until the parent alert expires. If you suspend the monitoring of a device, all the events are cleared, but the *alert* remains active. (This way, important information is not lost from the display, and you can easily resume monitoring of the device.)

If an event recurs, the existing event is not updated. Instead, the recurrence is shown as a new event with a new event ID.

Acknowledging an active alert signals other users that you are aware of the alert. When you click the **Acknowledge** button in the Alert Details window, this status change is populated to all Alert displays. If an event on the alert recurs, the status reverts to Active.

**Clearing an Alert:** This changes the state of the alert in the Alerts and Events display to cleared. You may want to clear an alert when you are aware of the condition or if you are receiving erroneous events and don't want to receive alerts on. When you click the **Clear** button in the Alert Details page, this status change is populated to all Alerts and Events displays. Once an Alert is cleared, the status cannot be changed back. In order to get the existing state of the device, you must manually delete and re-add the device into Operations Manager. The cleared Alert will be removed from the Alerts and Events display after Operations Manager performs its normal polling and determines that the alarm has been in the Cleared state for 30 minutes or longer (from the time of polling). If an event on the alert recurs, the status reverts to Active. *Also, clearing an alert will clear all the events associated with the alert.*

To view the details of the event, click the **Event ID** or go to the **Event History** tool to view the history of the same event over the last 24 hours and get the same details.

### Note(s):

- *This report is refreshed every 30 seconds.*
- *The names of events can be changed to names that are more meaningful to you. These customized names will be reflected in both the Alerts and Events display and any Alert History reports you generate. For information on changing the event names, refer to the Event Notification section in this chapter.*

# Alerts and Events Dashboard

## Event History / Details

**24 Hr. History on Same Event**

- Displays the activity history for the selected event
- Displays history for the last 24 hours; additional history available from the Reports menu

The screenshot shows the Cisco Unified Operations Manager interface. At the top, it says "Cisco Unified Operations Manager" and "Event History as of Fri 05-Jan-2007 16:45:19 PST". Below this is a table with 143 records. The table has columns for Event ID, Device Name, Device Component, Event Description, Time, Status, and Alert ID. Four events are visible, all with Event ID 0000UG9 and Description "HighUtilization". The status of these events is "Cleared", "Active", "Cleared", and "Active" respectively. Below the table, there are two detailed property windows. The first window is for EventID: 0000UG9 and the second is for EventID: 0000UG8. Both windows show properties like Component, Type, MaxSpeed, CurrentUtilization, InputPacketRate, TrafficRate, UtilizationThreshold, DuplexMode, and OutputPacketRate. Red boxes highlight the CurrentUtilization and UtilizationThreshold values in both windows. A callout box points to the Event ID column in the table, saying "Look at event details". Another callout box points to the first event in the table, saying "The event was cleared when the device was polled and utilization was found to be less than the threshold setting".

Event ID	Device Name	Device Component	Event Description	Time	Status	Alert ID
1. 0000UG9	nmtg-remote-2811.cisco.com	F-nmtg-remote-2811.cisco.com/3 [Se0/0/0] [CONNECTION TO NMTG-REMOTE-7200]	HighUtilization	05-Jan-2007 16:45:19	Cleared	00000WS
2. 0000UG8	nmtg-remote-2811.cisco.com	F-nmtg-remote-2811.cisco.com/3 [Se0/0/0] [CONNECTION TO NMTG-REMOTE-7200]	HighUtilization	05-Jan-2007 16:28:37	Active	00000WS
3. 0000UG6	nmtg-remote-2811.cisco.com	F-nmtg-remote-2811.cisco.com/3 [Se0/0/0] [CONNECTION TO NMTG-REMOTE-7200]	HighUtilization	05-Jan-2007 16:20:37	Cleared	00000WS
4. 0000UG3	nmtg-remote-2811.cisco.com	F-nmtg-remote-2811.cisco.com/3 [Se0/0/0] [CONNECTION TO NMTG-REMOTE-7200]	HighUtilization	05-Jan-2007 16:08:37	Active	00000WS

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Features 2-21

## Alerts and Events – Event History / Details

To view the details of the event, click the **Event ID** or go to the **Event History** tool to view the history of the same event over the last 24 hours and get the same details. The figure above illustrates the details of several events: first when the CCM was stopped and then a second event when the event was cleared when the CCM was polled by Operations Manager and found to be back online. All these events are tied to the same Alert ID since it is related to the same device.

**Clearing an Event:** Clearing an event will not clear the alert, unless this is the only event for the alert. It is not until all events for the alert are cleared, that the alert will also clear. Also, if you clear the alert on the device, the associated events will be cleared.

### Note(s):

- All Alert History reports generated from within the Alerts and Events display provide information from the past 24 hours.
- To generate an Alert History report on time spans beyond the last 24 hours, use Alert History from the Reports tab by selecting **Reports > Alert and Event History**. For more information, see *24-Hour Context-Based Alert and Event History Reports*.

# Alerts and Events Dashboard

## Launch Point for Other Tools / Reports

**Alert Details**

- Launch tools to obtain more information, run diagnostics to help determine the cause of the event, or run administration tools to correct the problem
- Also, view the potential impact due to the event on the device and/or the services that it provides

**Alert History**

Connectivity Details  
 Detailed Device View  
 Operations Manager Device Center  
 Polling Parameters  
 Threshold Parameters

**Alert Details**  
 as of Fri 05-Jan-2007 16:59:35 PST

Device Name: gigantic-6.cisco.com Device Type: MediaServer  
 Status: Active Alert ID: 00000UK Alert Age: 999 hr 00 min Latest Event Time: 05-Jan-2007 15:40:12

Events: (12)

#	Event ID	Description	Component	Time	Status	Tools	Impact
1.	0000T6C	InsufficientFreeMemory	RAM-gigantic-6.cisco.com/1	01-Jan-2007 03:40:45	Active	-- Select --	Moderate
2.	0000SKY	ServiceDown		01:55	Active	-- Select --	None
3.	0000SKZ	ServiceDown		01:55	Active	-- Select --	High
4.	0000SKU	ServiceDown		01:55	Active	-- Select --	Moderate

**Event Details**  
 as of Fri 05-Jan-2007 17:05:15 PST

Event ID: 0000SKZ

Name	Value
Event_Description	ServiceDown
Component	VS-gigantic-6.cisco.com/4
Productname	Cisco IP Voice Media Streaming App
Version	1.0.0.0-1
CurrentState	Stopped
AdminURL	/ccmadmin/showHome.do

Acknowledge Clear Close Help

View impact due to this event

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Features 2-22

## Alerts and Events –Alert Details, continue ...

In addition to viewing the event details and history, you can launch other tools to obtain more information or data as to why the event was generated. The reason for the event may be easy to determine or you may need to run additional diagnostic tests. The various tools available for selection will vary depending upon the device type.

This view also provides information on the impact of the event on the device and its services that it provides. To view the impact information, click on the Impact value (i.e. High, Medium, Low).

# Alerts and Events Dashboard

## Impact of Event on Services Provided by Device

The screenshot displays the Cisco Unified Operations Manager interface. At the top, it shows the Cisco Systems logo and the title "Cisco Unified Operations Manager Service Impact". Below this is a "Go to:" search field. The main content area is titled "Service Impact Report" and is divided into three sections: "Alerts", "Associated Events", and "Overall Impact Summary".

**Alerts**

Severity	Alert ID	Device Name	Device Type	Status
Critical	000000UK	gigantic-6.cisco.com	MediaServer	Active

[Back to Top](#)

**Associated Events**

Alert ID	Event ID	Description	Component	Status
000000UK	0000SKZ	ServiceDown	gigantic-6.cisco.com	Active

[Back to Top](#)

**Overall Impact Summary**

#	Impact
1	Music on Hold, Conference Bridge, and Annunciator applications will not work if this service is down

[Back to Top](#)

Provides an explanation of the impact that this failure will have on the rest of your IP telephony deployment.

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Features 2-23

## Alerts and Events –Impact of Event on Services Provided

Cisco has established severity definitions and has also determined the impact of certain conditions occurring or exceeding pre-defined thresholds. The Service Impact Report can be used to help the network manager get more details on the event and the possible impact that it may have on the Unified Communications services.

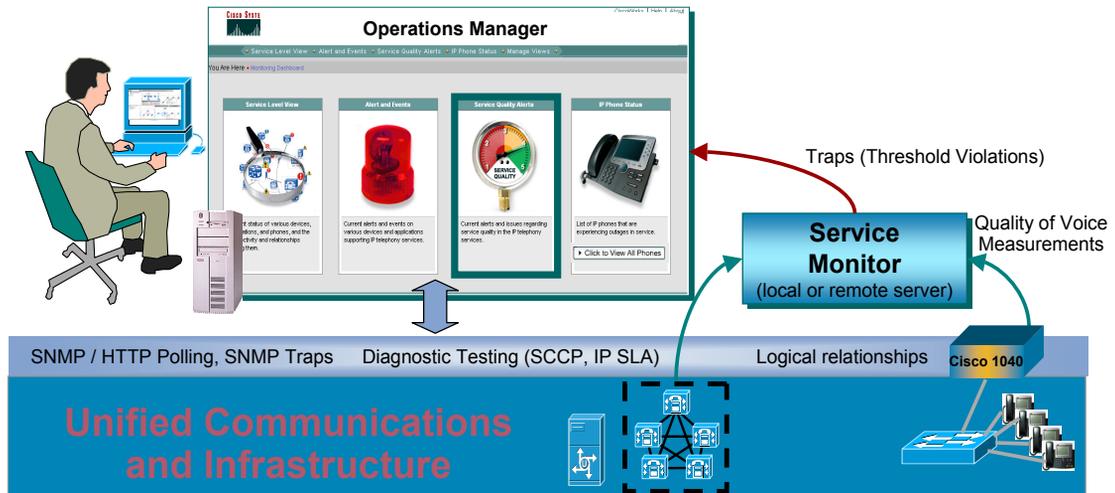
In this example, the event is marked critical and is a result of polling the available free virtual memory on the media server. The amount of virtual memory has fallen below the specified threshold. As a result, the server may experience increased page faults and thrashing, which results in poor server performance.

# Operational Status Views

## Service Quality Alerts Dashboard

### Integration with Service Monitor (SM) Application

When SM and Cisco 1040 sensor(s) are deployed in the network, SM can be configured to forward raw traps to Operations Manager (OM). OM can then correlate this event data with device details (switches, end users, or phone numbers). Reports, tools, and diagnostic tests in OM can be used to help troubleshoot the event.



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Features 2-24

## Service Quality Alerts Dashboard

The third (of four) Monitoring Dashboard in Operations Manager is the Service Quality Alerts View. The Service Quality Alerts dashboard will display alerts that Operations Manager has received from the Cisco Unified Service Monitor (SM) application. SM generates SNMP traps when it detects poor quality of voice measurements collected by a Cisco 1040 sensor or Cisco CallManager cluster. (CallManagers collected their measurements from gateways and phones that utilize the CVTQ algorithm.) Operations Manager will read the raw SNMP trap sent by SM, create an alert, and mark the alert with a severity level based on the quality of voice alert value.

*The integration of SM with OM provides the user with tremendous value.* Now, instead of receiving a raw SNMP trap containing the IP addresses of the RTP call stream, the network manager can view within OM device details. OM correlates the IP addresses with the connecting switches, end users, and phone numbers of the managed device. Additionally, the network manager can use drill down reports and tools to identify the two end IP phones, determine the operational status, and run a path trace or IP SLA test.

### Note(s):

- To use the Service Quality alerts display, you must have a licensed copy of Service Monitor configured to send traps to the Operations Manager server.
- You must also add the Service Monitor definition to Operations Manager using the **Administration > Service Quality Settings > Service Monitors** menu option.

Refer to the Service Monitor tutorial for more information on monitoring quality of voice.

# Operational Status Views

## Service Quality Alerts Dashboard

CiscoWorks | Logout | Help | About  
CiscoWorks | Logout | Help |

**CISCO SYSTEMS**

**Cisco Unified Operations Manager**  
A product from the Cisco Unified Communications Management Suite

Monitoring Dashboard | Diagnostics | Reports | Notifications | Devices | Administration

Service Level View | Alerts and Events | **Service Quality Alerts** | IP Phone Status | All IP Phones/Lines | Manage Views

You Are Here • Monitoring Dashboard

**View Service Quality Alerts**

**Service Level View**  
Current status of various devices, applications, and phones, and the connectivity and relationships among them.

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

**Service Quality Alerts**  
Current alerts and issues regarding service quality in the IP telephony services.  
Click to launch Service Monitor

**IP Phone Status**  
List of IP phones that are experiencing outages in service.  
Click to View All Phones

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Features 2-25

## Service Quality Alerts Dashboard

The **Service Quality Alerts** view is accessible under the Operations Manager Monitoring Dashboard tab. Either select the menu under the Monitoring Dashboard tab or click on the **Service Quality Alerts** picture (notice that the icon changes when the cursor is placed over the top of it).

Remember that service quality alerts are only displayed in this view if the following conditions are met:

- Cisco 1040 Sensors are monitoring RTP call streams
- Cisco 1040 Sensors forward call metrics to the Service Monitor application
- Gateways or IP phones with the CVTQ (Cisco Voice Transmission Quality) algorithm are deployed and managed by Cisco CallManagers, which are managed by SM
- Service Monitor (locally or remotely installed with OM) must be configured to forward poor quality of voice alerts to Operations Manager
- The Service Monitor server information must also be defined within Operations Manager

# Service Quality Alerts Dashboard Overview

## Service Quality Alert Views

Similar to the Alerts and Events View, except these alerts come from the optional Service Monitor application which gathers service quality data from the Cisco 1040 sensors and Cisco CallManager clusters

- Cisco 1040 Sensors monitor real-time RTP call streams
- Cisco CallManagers provide data collected from gateways and phones that use the Cisco Voice Transmission Quality (CVTQ) algorithm

**Cisco Unified Operations Manager**  
Service Quality Alerts as of Fri 22-Dec-2006 11:20:13 PST

Showing: All Alerts with 4 alerts

#	!	ID	Destination Type	Extension	Destination	Latest Event Time
1.	!	00000ZV	MediaServer		nrtg-hq-pub.cisco.com	22-Dec-2006 11:04:19 ♦♦
2.	!	00000ZN	IP Phone	3564	192.168.140.21	22-Dec-2006 11:04:19 ♦♦
3.	!	00000ZU	IP Phone	3541	192.168.140.19	22-Dec-2006 11:04:18 ♦♦
4.	!	00000ZU	IP Phone	3543	192.168.140.18	22-Dec-2006 11:04:18 ♦♦

Annotations:

- SQ Alerts can also be organized by Views (device groups).
- OM marks the incoming alerts with a severity level based on its MOS value
- One Alert is displayed per destination. An alert can be made up of 1 or more events (see next page). Click Alert ID to obtain details on the cause for the alert!
- Service Quality alerts clear themselves after 8 hours
- View Events

## Service Quality Alerts – Dashboard Overview

While the Cisco 1040 sensors are busy monitoring a SPAN port of a switch and analyzing each RTP data stream, it sends Mean Opinion Scores (MOS) values via Syslog messages to the Service Monitor application every 60 seconds. Service Monitor analyzes the incoming MOS values against a user-defined threshold and forwards any violations to Operations Manager.

Operations Manager is configured to listen for SNMP traps from Service Monitor. Operations Manager is also configured to mark the alerts with a Severity Level based on the value of the MOS.

The Service Quality Alerts display in Operations Manager shows the alerts received from Service Monitor that are occurring in your current view. Alerts are grouped by their severity: critical, warning, or informational. Within these severity groupings, alerts with the latest change are listed first.

When an alert is generated, it remains in the Service Quality Alerts display until it expires. Operations Manager sets an alert state to Expired when Operations Manager determines that the alarm has been in the *Cleared* state for 30 minutes or longer (from the time of polling). While the alert is in the display, if any of its events recur, the alert is updated. If an expired alert recurs, a new alert with a new ID is shown. This display is refreshed every 30 seconds.

### Note(s):

- Service Quality alerts clear themselves after 8 hours, but are available for viewing in the historical report.
- You can generate a 24-hour Service Quality Event History report on all events that occurred on devices in your view by clicking the History button in the upper right-hand corner of the window.
- The view pane lists the currently available views, or user-defined device groups, available for Service Quality Alerts. By default, two views--All Alerts and Suspended Devices--are always shown, and cannot be deleted from your Service Quality Alerts display.

# Service Quality Alerts Dashboard

## Alerts Details

**Service Quality Alert Details**

Drill down into a device alert (previous page) to see one or more conditions / events that caused the alert.

**SQ Event History** - Displays history for the last 24 hours; additional history available from the Reports menu

The source type can either be an endpoint or an IP Phone

**Refresh** - Update display  
**Clear** - Removes all events and changes status to Cleared; Alert lowered to the bottom in the Alerts Display list.  
**Notify** - Send an email message

OM tools like **Path Analysis** or **Node-to-Node** tests can be run to help troubleshoot connectivity or latency problems using the embedded IOS technology, IP SLA

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Features 2-27

## Service Quality Alerts – Alert Details

Upon selecting the Alert ID in the Service Quality Alerts View, the *Service Quality Alerts Details* dashboard is displayed in a new window listing the individual service quality events that caused the alert.

From the Service Quality Alert Details window, the user can view more information including the MOS value and primary cause for that MOS value. The user also has the option to launch several Operations Manager (OM) tools to help in troubleshooting efforts.

In the example above, you can also quickly see the MOS values. The event(s) which triggered the alert on the destination IP Phone or Endpoint is/are listed. The events with the latest change are listed first. Operations Manager was configured to marked MOS values below 3.5 as critical events. These settings for Service Quality alerts can be defined under the main Operations Manager menu, **Administration > Service Quality Settings > Event Settings**.

To view the details of the event, click the **Event ID** or go to the **Service Quality Alert History** tool to view the history of the same event over the last 24 hours and get the same details.

Additionally, Operations Manager tools like Path Analysis or Node-to-Node Tests can be run to help troubleshoot connectivity or latency problems using the embedded IOS technology, IP SLA. (Refer to the Diagnostics Tests features of Operations Manager for more information.)

### Note(s):

- *This report is refreshed every 30 seconds.*

# Service Quality Alerts Dashboard

## Event Details

Event ID: 0000QJ	
Property	Value
Destination	3541
Destination IP Address	192.168.140.19
Destination Type	IP Phone
Destination Model	7960
Switch For Destination	192.168.140.14
Destination Port	Fa0/7
SourceEndPoint	3543
Source IP Address	192.168.140.18
Source Type	IP Phone
Source Model	7961
Switch For Source	192.168.140.14
Source Port	Fa0/8
Detection Algorithm	ITU G.107 - 1040 Sensor based voice quality
MOS	4.4
Critical MOS Threshold	4.5
Cause	Jitter
Codec	G711Alaw 64k
Jitter	1 ms
Packet loss	0 Packets
Sensor MAC	001120FFD004
Number of suppressed traps	9
Suppression start time	Fri 22-Dec-2006 03:04:18 PST
Suppression end time	Fri 22-Dec-2006 11:04:18 PST

### Service Quality Event Details

- Call information
  - Devices
  - Phone Numbers
  - Ports
  - Addresses
- Detection Algorithm
  - Sensor or CVTQ
- MOS Values
  - Reported
  - Threshold
- Main Cause for low MOS
  - Can be either *Packet Loss* or *Jitter*
- Codec used
- Actual Jitter and Packet Loss for the reported 60 second period
- Probe ID of the reporting Cisco 1040

## Service Quality Alerts – Event Details

If the **Event ID** was selected in the Alert Details window, the *Event Details* will open in a new window. The *Event Details* includes information about the endpoints (phone numbers, IP address, switch and port connectivity), as well as information about the nature of the violation (reported MOS, user-defined MOS threshold, primary cause for low MOS, Codec used for call, actual jitter and packet loss values for the 60 seconds this violation represents).

For this particular violation, the reported MOS was 2.4 which is lower than the SM user-defined threshold of 3.5, and the primary cause of the low MOS was jitter which was reported at 40 msec for the 60 sec reporting period.

# Operational Status Views

## IP Phone Status Dashboard

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Cisco Unified Operations Manager  
A product from the Cisco Unified Communications Management Suite

Monitoring Dashboard | Diagnostics | Reports | Notifications | Devices | Administration

Service Level View | Alerts and Events | Service Quality Alerts | IP Phone Status | All IP Phones/Lines | Manage Views

You Are Here | Monitoring Dashboard

View IP Phone Status

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

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

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

IP Phone Status  
List of IP phones that are experiencing outages in service.  
Click to View All Phones

View all IP Phones Report (See Reports section of this tutorial for more details)

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Features 2-29

## IP Phone Status Dashboard

The last of the four Monitoring Dashboards in Operations Manager is the *IP Phone Status* view. Different from the Alerts and Events display, this Monitoring Dashboard provides instant access to IP phone outage information.

The *Phone Activities* view is accessible under the Operations Manager Monitoring Dashboard tab. Either select the menu under the Monitoring Dashboard tab or click on the *IP Phone Status* picture (notice that the icon changes when the cursor is placed over the top of it).

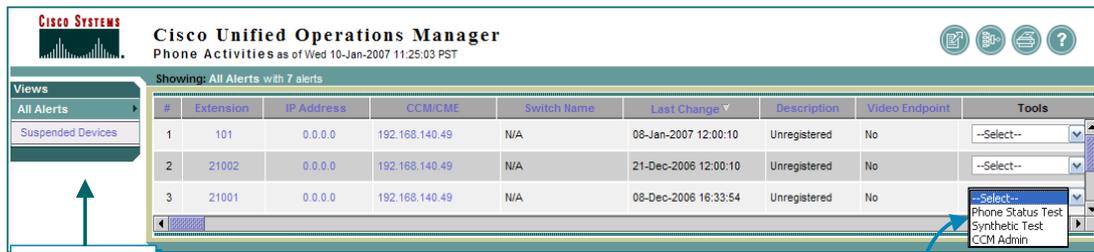
Quick access to a report on *all IP Phones* detected in the network is available by selecting "*Click to View All Phones*"; this report is illustrated in the Reports section of this chapter.

# IP Phone Status Dashboard Overview



## Phone Activities Display

Contains information about the IP phones in the network that have become disconnected from the switch, are no longer registered to a Cisco CallManager, or have gone into SRST mode



The screenshot shows the Cisco Unified Operations Manager interface. The title bar reads "Cisco Unified Operations Manager" and "Phone Activities as of Wed 10-Jan-2007 11:25:03 PST". Below the title bar, it says "Showing: All Alerts with 7 alerts". On the left, there is a "Views" sidebar with "All Alerts" selected and "Suspended Devices" below it. The main area contains a table with the following data:

#	Extension	IP Address	CCM/CME	Switch Name	Last Change	Description	Video Endpoint	Tools
1	101	0.0.0.0	192.168.140.49	N/A	08-Jan-2007 12:00:10	Unregistered	No	--Select--
2	21002	0.0.0.0	192.168.140.49	N/A	21-Dec-2006 12:00:10	Unregistered	No	--Select--
3	21001	0.0.0.0	192.168.140.49	N/A	08-Dec-2006 16:33:54	Unregistered	No	--Select--

The "Tools" column for the third row is expanded, showing options: "Phone Status Test", "Synthetic Test", and "CCM Admin".

IP Phone Alerts can be organized by Views

## Launch Point

Launch Diagnostic Test or CCM Administration page

## IP Phone Status – Dashboard Overview

Two types of outages are monitored: signaling-related outages and IP connectivity-related outages. It is also possible to get information about an IP phone's switch and port or launch diagnostic test or the CCM administration page, allowing administrators to troubleshoot problems that may have wider scope (at the switch level) than just the IP phone.

The Phone Activities display shows information about the IP Phones in your network that have become disconnected from the switch, are no longer registered to a Cisco CallManager, or have gone into SRST (Secure Survivable Remote Site Telephony) mode. The following events cause activity to be displayed on the Phone Activities display:

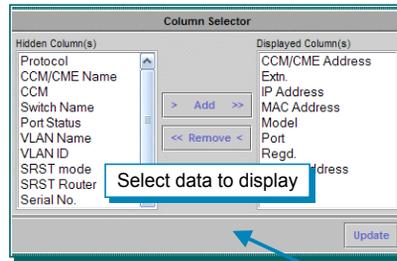
- Phone Removed
- SRST Entered
- SRST Suspected
- Suspect Phone Detected

# IP Phone Status View

## All Phones



**All Phones**  
Contains information about all IP phones in the network



**Cisco Unified Operations Manager**  
All IP Phones/Lines as of Wed 10-Jan-2007 11:30:34 PST

Showing 1 - 20 of 20 records

	Extn.	User	IP Address	MAC Address	Model	Regd.	CCM/CME Address	Switch Address	Port
1.	2507	Auto 2507	192.168.137.59	0009b7da03da	7960	yes	192.168.140.2	192.168.137.24	Fa1/0/10
2.	3564	Auto 3564	192.168.140.21	00195628467f	7961	yes	192.168.140.2	192.168.140.14	Fa0/5
3.	1021	Auto 1021	192.168.137.5	00036b7ffb1	7960	yes	192.168.137.4	192.168.137.24	Fa1/0/21
4.	3004	Auto 3004	192.168.137.36	0009b7542268	7960	yes	192.168.137.45	192.168.137.24	Fa1/0/3
5.	3541	SEP003094C43921	192.168.140.19	003094c43921	7960	yes	192.168.140.2	192.168.140.14	Fa0/7
6.	21002	N/A	0.0.0.0	000111222335	7971	no	192.168.140.49	N/A	N/A

Rows per page: 20 Go to page: 1 of 1 Pages

Select an item then take an action--> Launch

Launch Diagnostic Test(s) for selected phone

## IP Phone Status – All Phones

Quick links are available to view all IP phones associated with the managed Cisco CallManagers.

Quick access to a report on *all IP Phones* detected in the network is available by selecting the “**Click to View All Phones**” button located within the IP Phone Status View icon.

This report provides all information available for the IP phones in the network. From this report, you can launch selective diagnostic tests for selected phones.

*<Intentionally Blank>*



# Diagnostic Tests

- Operational Status Views
- **Diagnostic Tests**
- Inventory Management
- Reports
- Event Notification
- Customization / Advanced Features



# Diagnostic Tests

## Overview

- **IP Phone Status Tests**
  - Use to determine the reachability of one or more phones; Test sends a ping to the IP phone from either both the OM server or just from an IP SLA-capable Cisco IOS device
- **SRST (Survivable Remote Site Telephony) Tests**
  - Test reachability to local SRST router; when IP Phones go into SRST mode, they rely on local SRST router for call processing
- **Synthetic Tests**
  - Use to test the availability of voice services; OM can simulate synthetic IP phones to request services
- **Batch Tests**
  - Acceptance tests, check-out tests, site inventory and status
- **Node-to-Node Tests**
  - Use to ensure QoS by measuring response time, latency, and jitter from a source to a destination



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Features 2-34

## Diagnostic Tests - Overview

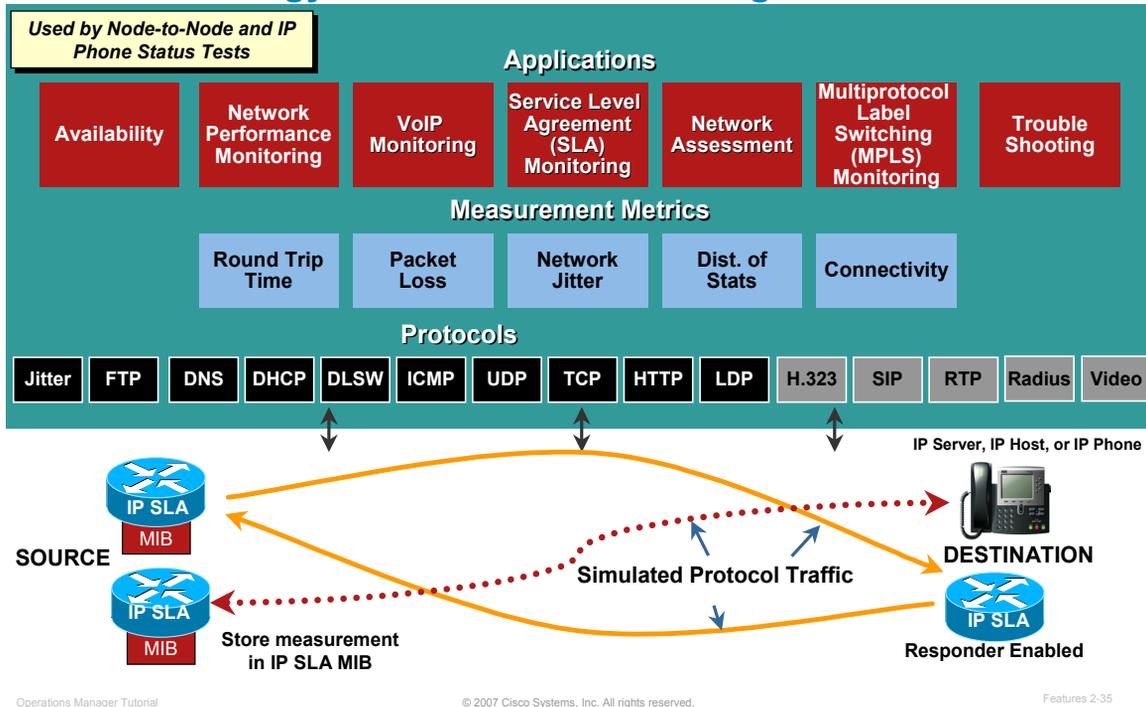
Operations Manager comes with a rich set of diagnostic tests that can be used to aid in trouble isolation and resolution. There are primarily five types of tests:

- **IP Phone Status Tests** - The IP phone status tests can be used to determine the current operational status of the IP phones in terms of signaling and IP connectivity. These tests also utilize the IP SLA feature in IOS devices to test the reachability of IP phones in the network. Users can supply a list of phones to test and configure when to run the tests (on-demand or scheduled).
- **SRST (Survivable Remote Site Telephony) Tests** – The SRST tests can be used to test the IP phones reachability to the local SRST router. When an IP phone goes into SRST mode (access to their Cisco CallManager is down), they rely on the locally configured SRST router for continued call processing.
- **Synthetic Tests** - The synthetic tests serve to replicate user activity (receiving a dial tone, making an end-to-end phone calls, leaving voice mail, and creating/joining conference calls). These tests can verify the functional availability of the supporting infrastructure and validate different configuration aspects such as route patterns, route lists, inter-cluster trunks, and gateway dial peers.
- **Batch Tests** - Batch tests can be used to test the health and connectivity of a branch office. Batch tests consist of a set of synthetic tests that are run on voice applications (for example, Cisco Unified CallManager Express or Cisco Unity Express) that are deployed in a branch office and a set of phone tests that are run on real phones (running SCCP) in the branch office.
- **Node-to-Node Tests** - The node-to-node tests use the services of IP Service Level Agreements (IP SLA) feature, formerly known as Service Assurance Agent (SAA), in Cisco IOS devices to simulate traffic in the network and then determine network characteristics such as reachability, response time, latency, jitter, packet loss, and network quality. Each of these tests can be run in a continuous monitoring mode as well as in either a scheduled or on-demand mode. The results are presented through a variety of reports.

Each of these will be discussed in more detail in the upcoming pages. But first, let's review the IP SLA feature embedded in IOS devices since it is used in both the IP phone status tests and node-to-node tests.

# Diagnostic Tests

## Terminology Review - Understanding IP SLAs



## Terminology Review - Understanding IP SLAs

A quick overview of IP SLA is provided here since it is used in both the IP phone status tests and the node-to-node tests.

IP SLA stands for IP Service Level Agreements and is a feature in most Cisco IOS devices (see appropriate versions below). Since IP SLAs are embedded into IOS devices, there is no need to deploy other diagnostic devices into the network to run tests.

Cisco IOS IP SLA measures network performance by sending one or more simulated protocol test packets to a destination IP device or a Cisco router. Cisco IOS IP SLA uses the timestamp information to calculate performance metrics such as jitter, latency, network and server response times, packet loss, Mean Opinion Score (MOS) voice quality scores, and other network statistics. The "Source" IP SLA device generates the simulated protocol traffic and stores the test measurements in its IP SLA MIB. The results can easily be retrieved for viewing using SNMP and tools like CiscoWorks.

With IP SLAs, the user can continuously, reliably, and predictably measure network performance and proactively monitor network health or run-time diagnostic tests to aid with troubleshooting.

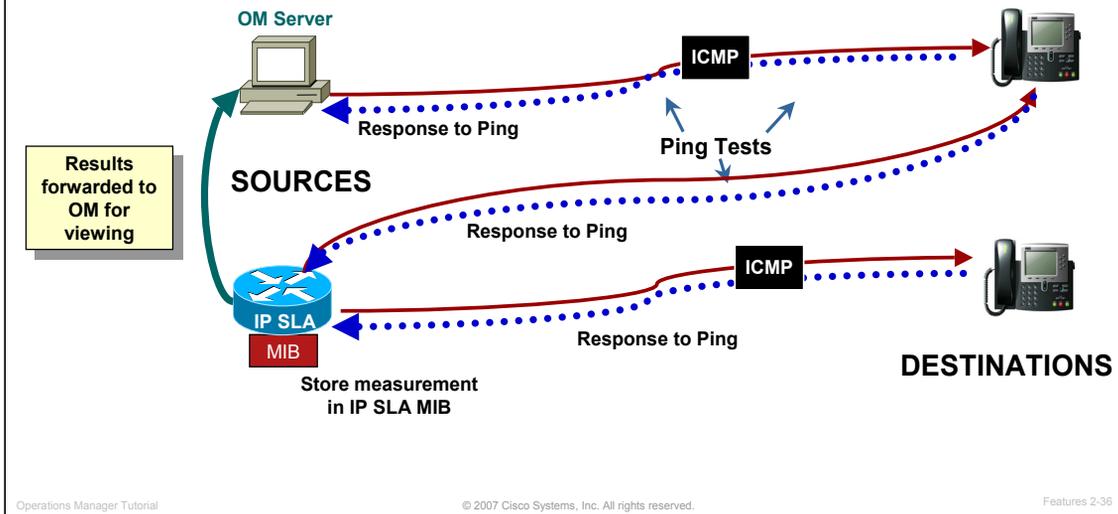
### Note(s):

- IP SLAs was previously known as the Response Time Reporter (RTR) and Service Assurance Agents (SAAs) in earlier IOS versions.
- Depending on the version of IOS, different protocols can be simulated. IP SLA v2.1 is supported in IOS version 12.0(5)T, 12.1(1), and higher. IP SLA v2.1 is supported in IOS version 12.3(4)T and higher.
- Configuring the IP SLA is simplified by using Cisco tools (Operations Manager or Internetwork Performance Monitor (IPM) or by using the Command Line Interface of the IP SLA device.

# Diagnostic Tests

## IP Phone Status Tests - Overview

- Test sends a ping to the IP Phone from either both the OM server or just from an IOS, IP SLA-enabled, device
- Test can be run once or on a schedule



## Diagnostic Tests – IP Phone Status Tests

The Phone Status Test determines if an IP Phone is *reachable* using a ping test from the Operations Manager server and/or from a specified IOS device that is IP SLA-capable.

A phone status test consists of the following:

- A list of IP phones to test, selected by you.
- A testing schedule that you configure.
- IP SLA-based pings from an IP SLA-capable device (for example, a switch, a router, or a voice router) to the IP phones and, optionally, pings from the Operations Manager server to the IP phones.

The figure above illustrates two IP Phone status tests configured on an IP SLA-capable voice router, with one of the tests also having the Operations Manager server testing reachability to the destination IP Phone.

Using Operations Manager, it is easy to configure an IP SLA echo test on the IP SLA-capable IOS device, provided that the device has enough memory provisioned to allow Operations Manager to do so. The results of the test are then forwarded to the Operations Manager server for viewing. A phone is considered unreachable after no response to either an IP SLA-based ping or an Operations Manager ping, if enabled. If the IP phone is unreachable, Operations Manager generates the PhoneReachabilityTestFailed event.

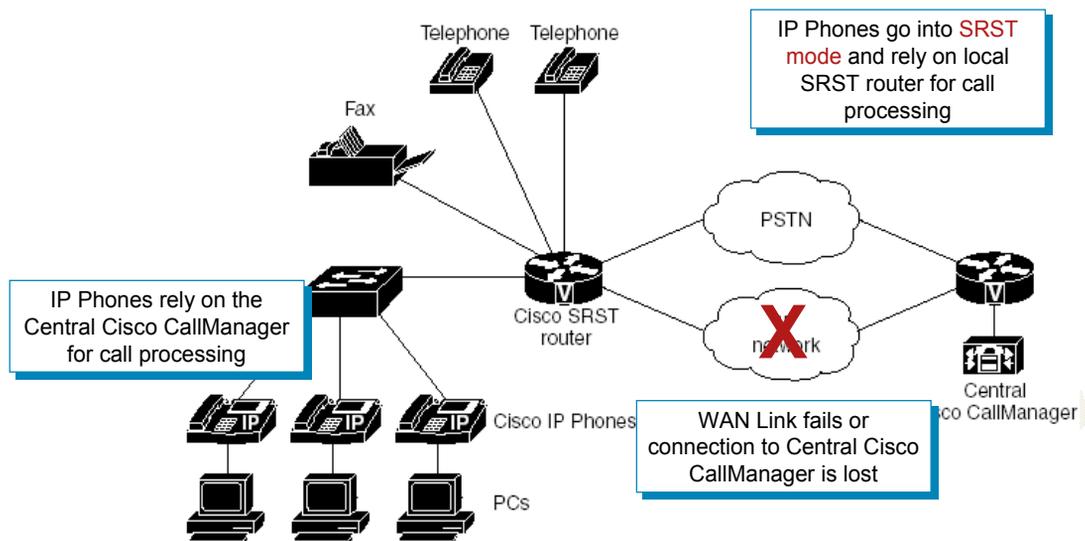
Below is an example of the IP Phone status test results. (SAA Result is the ping test from the IP-SLA device. NMS Result is the ping test from the Operations Manager server.)

### Phone Status Test Results

Test Results			
PhoneIP	SAA Result	NMS Ping Result	Registration Status
172.20.5.57	Passed	Passed	Unregistered
44.44.1.3	Passed	Passed	Unregistered
44.44.1.2	Passed	Passed	Unregistered

# Diagnostic Tests

## SRST Tests - Overview



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## Diagnostic Tests – SRST Tests

Remote branch offices may be configured for Survivable Remote Site Telephony (SRST) in case the Cisco Unified CallManager becomes inaccessible. A branch office normally relies on a central CallManager for call processing. If the Cisco Unified CallManager becomes inaccessible, phones can use a Cisco voice router for call processing. Phones go into SRST mode when either of the following happens:

- The WAN link to the Cisco Unified CallManager at the central site goes down
- The connection to the Cisco Unified CallManager is lost

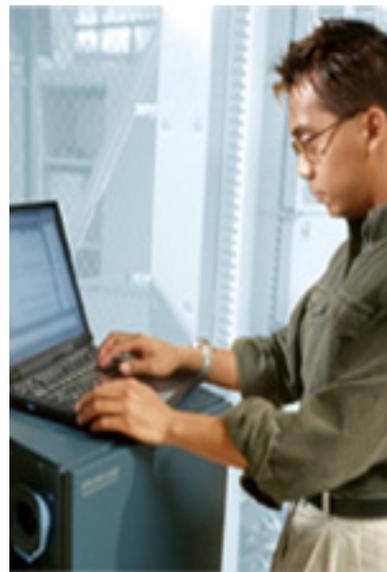
SRST allows phones in branch offices to continue to function until the WAN link comes up or until the phones can register with a Cisco Unified CallManager again.

The SRST test runs IP SLA Jitter tests from the source router (near Central Cisco CallManager) to detect the reachability of the target SRST router (at the branch office). Use OM to configure the IP SLA test on the source router.

# Diagnostic Tests

## Synthetic Transactions Tests - Overview

- **Tests the Availability of Voice Services**
    - Cisco CallManager (CCM) and Express (CME)
    - TFTP Server
    - Cisco Emergency Response (CER)
    - Cisco Conference Connection (CCC)
    - Cisco Unity™ and Unity Express
  - **7 Different Voice Application Tests**
    - OM simulates a Cisco 7960 IP phone requesting services for most tests
    - Two real IP phones can be used for an end-to-end call test
  - **OM compares actual results against expected results**
    - Skinny Client Control Protocol (SCCP)
    - TFTP server
  - **Events generated based on results**
    - 20 second timeout is considered a test failure
    - Incorrect response
- Do not create more than 100 end-to-end call tests that run at one-minute intervals.
  - No more than 250 synthetic tests can be defined.



## Diagnostic Tests - Synthetic Transactions Tests

Synthetic Transactions are tests that can be used to measure the availability of voice applications in the network. These tests verify whether the voice application can service requests from a user, such as verifying that phones can register with a Cisco CallManager (CCM). Operations Manager supports synthetic testing for the following applications:

- Cisco CallManager and Cisco CallManager Express
- Cisco TFTP Server
- Cisco Emergency Responder
- Cisco Conference Connection
- Cisco Unity and Cisco Unity Express

Seven different synthetic transactions, within Operations Manager, can be used to create a test of voice services. Multiple tests can be configured against a single CCM. In most cases, the synthetic tests can use synthetic phones, simulated by Operations Manager, to measure the availability of voice applications by emulating your actions. For example, a synthetic test places a call between clusters and then checks to see if the call is successful. If a synthetic test fails, Operations Manager generates a critical event. Such events are displayed in the Alerts and Events display

To perform the synthetic transactions, the user configures the necessary number of simulated Cisco 7960 phones in the CCM database; however, if auto registration is enabled in CCM, this step is not necessary. Each synthetic transaction requires a unique phone number and MAC address. Using the Operations Manager graphical user interface (GUI), the user uses the simulated phones to configure the set of transactions to run for a test against the CCM. Operations Manager then acts as a simulated IP phone using the SIP or Skinny Client Control Protocol (SCCP) signaling protocols to request the voice services.

For each test, Operations Manager expects a certain response. If an unexpected response or no response (20 second timeout) is received, the test fails. A failed test could indicate that the services are down, the network is slow or mis-configured, or the transactions themselves were mis-configured.

Let's now take a closer look at the seven different types of synthetic transactions configurable with Operations Manager.

# Diagnostic Tests

## Synthetic Transactions Tests

Test Name	Test Description
Phone Registration	Checks if a phone can register with the CallManager
Off-Hook	Checks if a phone gets dial tone
End-to-End Call	Checks if a phone can call another phone (real or simulated)
Conference Connection	Creates a conference and connects to it
Unity Message Waiting Indicator	Checks if the message waiting indicator light goes on after a message is left
Cisco Emergency Responder (CER)	Checks if CER is able to route calls based on a 911 call
TFTP download	Checks if the phone configuration is downloadable

- *OM simulates a Cisco 7960 IP Phone requesting call services for most tests*
- *OM simulates a Cisco 7960 IP Phone calling another simulated, real, or analog phone (end-to-end call)*

## Diagnostic Tests - Synthetic Transactions Tests

The synthetic tests available within Operations Manager and the results that each test must produce to pass are listed here.

- **Phone Registration Test** - This test opens a connection with the CCM and registers a simulated IP phone. The test passes if the registration of the phone is successful.
- **Off-Hook Test** – This test simulates an off-hook state to the CCM and checks for receipt of a dial tone. The test passes if it receives a dial tone signal from the CCM.
- **End-to-End Call Test** – This test initiates a call to a second simulated or real IP phone. The test passes if it registers, goes off-hook, and places the call; and there is a ring indication; and the destination phone goes off-hook to accept the call.

Note: If *call progress tones* and *announcements* are configured on the gateway for your end-to-end call, the test may succeed even before the phone rings or after a couple of rings. This indicates that your gateway is working correctly.

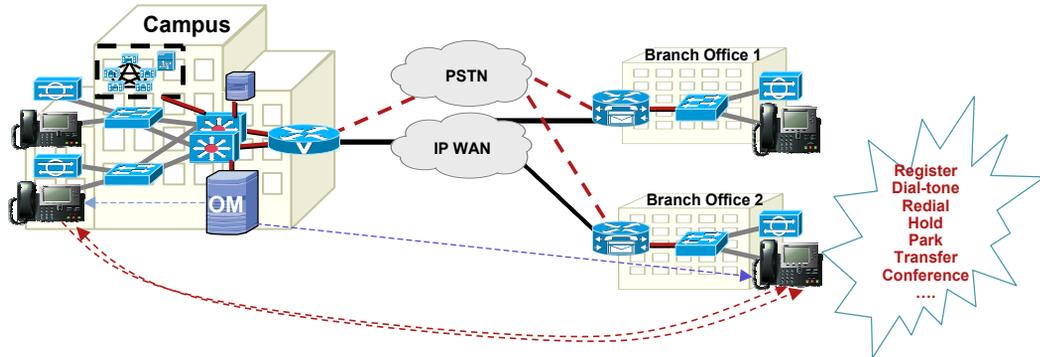
- **Cisco Conference Connection Test** – This test creates a conference (meeting) in the Conference Center and connects to the meeting. This test passes if a conference is created with the specified meeting ID and the call is initiated; and the first person and second person (if configured) successfully connects to the conference.
- **Message Waiting Indicator Test** – This test calls the target phone and leaves a voice message in the voice mail box. This test passes if there is activation of the phone's message waiting indicator. The message is then deleted and the message waiting indicator is deactivated.
- **Emergency Call Test** – This test initiates a call to the emergency number to test the dynamic routing of emergency calls. This test passes if all calls initiated and if a ring indication on Public Safety Answering Point (PSAP) and On Site Alert Number (OSAN), if configured.
- **TFTP Download Test** – This test performs a TFTP get-file operation on the TFTP server. The test passes if it successfully downloads a configuration file from the TFTP server.

Note: The phones in all of these synthetic tests, except for Phone Registration, remain registered with the CCM unless there is a failure.

# Diagnostic Tests

## Batch Tests Overview

- Batch tests enable you to test the health and connectivity of a branch office using multiple synthetic tests and IP phone tests defined in an XML file
- Comprehensive phone-to-phone tests: End-to-End calls (remote site, PSTN, DID), Phone registration, Off-hook, Conference, Hold, Park, Transfer...
- Dial plan tests: Verify class of restriction and gateway availability
- Acceptance tests, check-out tests, site inventory, and status



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## Diagnostic Tests – Batch Tests

Batch tests provide a means to test the health and connectivity of a branch office. Batch tests consist of a set of synthetic tests (previously discussed) that are run on voice applications (for example, Cisco Unified CallManager Express or Cisco Unity Express) that are deployed in a branch office and a set of phone tests that are run on real SCCP IP phones in the branch office. Batch tests can be run once a day to verify the health of the voice network in the branch office.

Create Batch Tests to conduct:

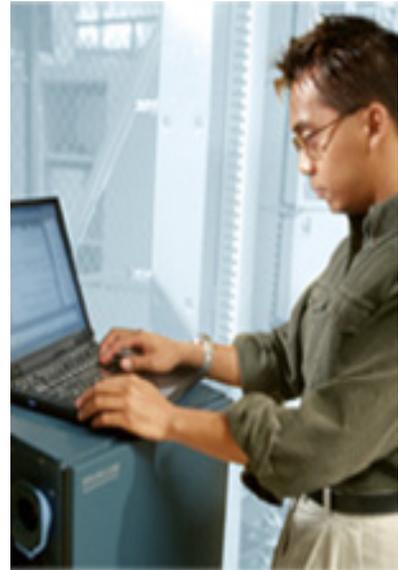
- Comprehensive phone-to-phone tests such as: End-to-End calls (remote site, PSTN, DID), Phone registration, Off-hook, Conference, Hold, Park, Transfer, etc.
- Dial plan tests: Verify class of restriction and gateway availability
- Acceptance tests, check-out tests, site inventory, and status

# Diagnostic Tests

## Node-to-Node Tests - Overview

- Tests the UC Infrastructure for QoS
- Use Node-to-Node tests to ensure Quality-of-Service (QoS) for the end users
- Evaluate protocol response times, network latency, and jitter
  - Response times are the most direct measurement of the user's experience
  - Latency is the delay that components in a path add to the overall response time
  - Jitter is the amount of variance in interpacket delay of voice packets

Up to 250 Node-to-Node tests can exist at a time



## Diagnostic Tests - Node-to-Node Tests

Node-To-Node tests monitor the response time and availability of multi-protocol networks on both an end-to-end and a hop-by-hop basis.

After collecting this data you can use the graphing function in Operations Manager to examine changes in network performance metrics in real time.

The next few pages look at the different Node-to-Node tests available in Operations Manager. Node-To-Node tests can be created one at a time, or imported from a file to add more than one test at a time. Up to 64 Node-To-Node tests can exist at a time.

Below is a table that specifies the appropriate IOS version and IP SLA version that supports these tests.

Test	Required Versions	
	IP SLA	Cisco IOS
Ping Echo	2.1.0 and higher	12.0(5)T, 12.1(1), and higher
Ping Path Echo		
UDP Echo		
Data Jitter		
<b>Note:</b> Without ICPIF/MOS values.		
Data Jitter	2.2.0 and higher	12.3(4)T and higher
<b>Note:</b> With ICPIF/MOS values.		
Gatekeeper Registration Delay		12.3(14)T and higher
VoIP Post Dial Delay		

# Diagnostic Tests

## Node-to-Node Tests

### UDP Echo Tests

- Measure round-trip response time between source and endpoint (UDP Server) using a specified UDP port
- Specify test traffic's payload size and priority (IP Precedence or DSCP value)
- Optionally use an [IP SLA-capable](#) device (with the responder enabled) as the destination device to remove processing delay at the destination

**Parameters**

Request Payload: 16 bytes

IP QoS: IP Precedence 0 (none)

**Thresholds**

Round-trip Response Time: 300 msec

### Data Jitter Tests

- Measures the variance of the delay (jitter) of the UDP test packets, packet loss, and round-trip latency statistics
- Requires an [IP SLA-capable](#) device (with the responder enabled) as the destination device

**Parameters**

Codec Type: G.711 ulaw

Call Duration: 8 seconds

Voice Quality Expectation: Land line

IP QoS: IP Precedence 5

**Thresholds**

	Packet loss	Jitter
<input checked="" type="checkbox"/> Source to Destination:	3 %	40 msec
<input checked="" type="checkbox"/> Destination to Source:	3 %	40 msec
<input checked="" type="checkbox"/> Average Latency:	300 msec	
<input checked="" type="checkbox"/> Node-to-Node Quality:	Fair	

**Note:** With an IP SLA device as the test endpoint, the IP SLA responder can improve accuracy of the test by responding to IP SLA packets, and use user-defined UDP/TCP ports

## Node-to-Node Test Descriptions

Let's look closer at some of the available node-to-node diagnostic tests.

### UDP Echo Tests

This test measures UDP server latency. The UDP echo test sends a packet with the configured number of bytes to the destination with the specified port number and measures the response time. The user can specify the payload size of the test and the priority of the test packets using IP Precedence or DSCP (Differentiated Services Code Point) values.

There are two destination device types for the UDP Echo operation: RTR Responders, which use IP SLA, and UDP servers, which do not. If the destination is a Cisco router, the user has an option to enable the IP SLA responder in the destination router. The responder would either listen to the default UDP echo port or to the port that the user specifies. Using the IP SLA responder feature can increase accuracy as the process delay in the destination router is assessed.

### UDP Data Jitter Tests

With the addition of real-time traffic like voice traffic over IP networks, the focus shifts not just in the reliability of the network, but also on the delays involved in transmitting the data. Real-time traffic is delay sensitive. In the case of voice data, packet loss up to some extent is manageable, but frequent losses impair communication between endpoints.

The UDP Jitter operation was designed to measure the delay, delay variance and packet loss in IP networks by generating UDP test traffic. The Jitter operation sends N packets, each of size S, from source device to a destination router (which requires IP SLAs responder enabled) each T milliseconds apart. All these parameters are user configurable. In Cisco's encoding implementation, if G.729 CODEC is used, then frames are generated every 10 ms and an RTP payload size of 10 bytes. Cisco gateway combines two such frames and transmits them every 20ms. So, the Jitter operation defaults values are set to these values to simulate voice traffic. By default 10 packets are sent for each operation.

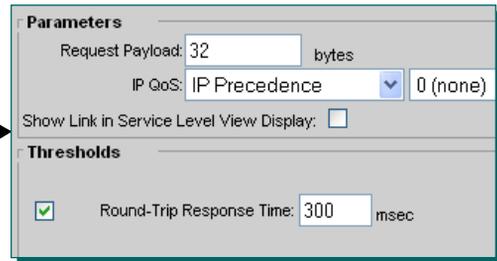
The packets sent out to measure Jitter carry packet sequence (sending sequence and receiving sequence) information, as well as sending and receiving timestamps from the source and the responder. Based on this information, Jitter operation is capable of measuring: per-direction inter-packet delay variance (jitter), per-direction packet-loss, average round trip time, and one-way delay.

# Diagnostic Tests

## Node-to-Node Tests, (Cont.)

### ICMP Ping Echo Tests

- Measure end-to-end round-trip response time – time to send ICMP request and receive ICMP reply; able to specify path using LSR option
- Generate tests to any IP address;  
**Does not require IP SLAs Responder**



**Parameters**

Request Payload: 32 bytes

IP QoS: IP Precedence 0 (none)

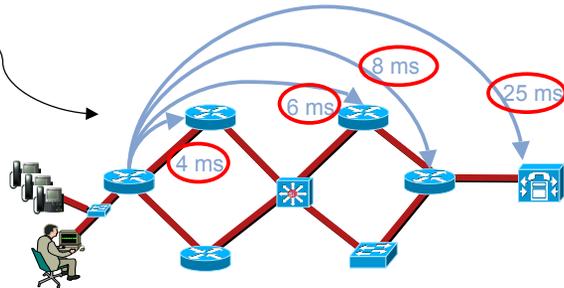
Show Link in Service Level View Display:

**Thresholds**

Round-Trip Response Time: 300 msec

### ICMP Ping Path Echo Tests

- For each possible path, measure hop-by-hop response time between source device and any IP device
- Discovers the paths using traceroute and then measures response time between source device and each hop in the path



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## Node-to-Node Test Descriptions, continue ...

### ICMP Echo Tests

The ICMP Echo operation measures end-to-end response time between a Cisco router and any IP-enabled device. Response time is computed by measuring the time taken between sending an ICMP echo request message to the destination and receiving an ICMP echo reply. The test operation provides an option to compute response time on a specific path with LSR option in IP packet.

If there are multiple equal cost routes between source and destination devices, Echo operation has the capability to identify a specific path by using LSR option (if enabled on intermediate devices). This feature enables IP SLAs to discover paths more accurately, as compared to a typical traceroute.

Additionally, the tests also allow a user to measure Quality of Service (QoS) between endpoints by setting IP Precedence or DSCP bits on an IP packet.

### ICMP Path Echo Tests

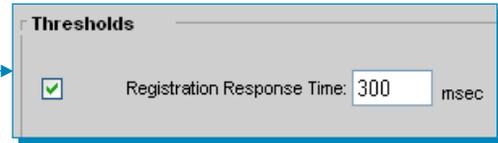
The ICMP Path Echo operation computes hop-by-hop response time between a Cisco router and an IP device on the network. It discovers the path using traceroute and then measures response time between the source device and each intermittent hop in the path.

# Diagnostic Tests

## Node-to-Node Tests, (Cont.)

### Gatekeeper Registration Delay

- Measure the response time required for a gateway to register with a gatekeeper



Thresholds

Registration Response Time: 300 msec

Note: The source gateway must have SIP or H323 configured on it.

## Node-to-Node Test Descriptions, continue ...

### Gatekeeper Registration Delay Tests

This test measures the time required for a gateway to register with a gatekeeper. The test sends a lightweight Registration Request (RRQ) from an H.323 gateway to an H.323 gatekeeper and receives a Registration Confirmation (RCF) from the gatekeeper. The test then measures the response time.

#### Note(s):

- For the Gatekeeper Registration Delay test to run, the source gateway must have SIP or H323 configured on it.



# Inventory Management

- Operational Status Views
- Diagnostic Tests
- **Inventory Management**
- Reports
- Event Notification
- Customization / Advanced Features

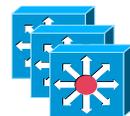
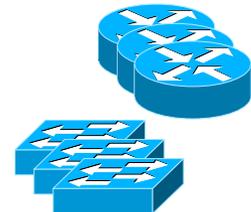


# Inventory Management Overview



## ➤ Device Management Features

- Populate the OM Inventory so that the devices can be managed by Operations Manager
- Manage device credentials (username, passwords, etc.)
- Schedule the inventory collection
- Group devices for easier task execution
- Generate Reports



## ➤ IP Phone Management Features

- Generate Reports



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## Inventory Management - Overview

All network management products have one common configuration required before any management task can commence - configuring the tool to tell it which devices it needs to manage. The CiscoWorks solutions are not just one tool, but a collection of tools; all needing to be told which devices to manage. The adding of devices to a tool along with any necessary credentials (passwords, SNMP strings) can be a time consuming process. Fortunately, rather than perform this task for each CiscoWorks application, the CiscoWorks Common Services software provides a centralized Device and Credentials Repository (DCR) that each application can then pull the desired subset of devices and credentials from in which to manage. This assists in the maintenance of the tools – for example, if a device credential is changed, rather than updating a number of tools, only the DCR needs to be updated ensuring that all CiscoWorks applications are using the most up-to-date information.

For Operations Manager to monitor a device, you must first add the device to the DCR. Once a device is added to the DCR, you can then add it to the OM inventory, which is separate from the DCR, so that it can be managed. Once the devices are in the OM inventory, you can then schedule the Operations Manager monitoring collection.

CiscoWorks tasks are often run against a set of devices. Selecting the desired devices from a list of possibly thousands of devices could be time consuming and frustrating. Therefore, devices can be grouped using rules based on device attributes. Now, a group can simply be selected as the input for a task, saving time. As you will see, each CiscoWorks application has a number of pre-defined System Groups and a user can also create their own groups. These groups can be shared between applications.

And finally, Inventory Management does not only support the management of routers, switches, media servers, and gateways, but it also includes the endpoints, such as the IP phones connected to these devices.

# Inventory Management

## Understanding Device Credentials

- Device credentials are needed to allow Operations Manager to gather details / data from the devices
- Device credentials include:
  - Device properties (Hostname, IP address, Cluster)
  - Telnet / Enable / Rx-Boot mode / Auto Update server username and passwords
  - SNMP v1, v2, or v3 settings
  - HTTP / HTTPS settings
  - WMI (Windows Management Instrumentation) Credentials - MCS-based application servers only (I.e. Cisco Unified Contact Center and Cisco Unity)
  - User defined fields
- Device credentials are maintained in Cisco Works Common Services DCR (Device Credential Repository)
  - Operations Manager runs on the Cisco Works Common Services (CS) v3.0.5;
  - CS provides background services for communications, security, scheduling, etc.
- Devices can be added to Operations Manager using:
  - Automatic device discovery / Manual device addition / Import
  - Synchronize with other DCRs in the network

## Inventory Management – Understanding Device Credentials

Device credentials are needed to allow Operations Manager to gather details / data from the devices. These credentials include information, such as:

- Device properties (Hostname, IP address, Cluster)
- Telnet / Enable / Rx-Boot mode / Auto Update server username and passwords
- SNMP v1, v2, or v3 settings
- HTTP / HTTPS settings
- WMI (Windows Management Instrumentation) credentials
- And optional user-defined fields

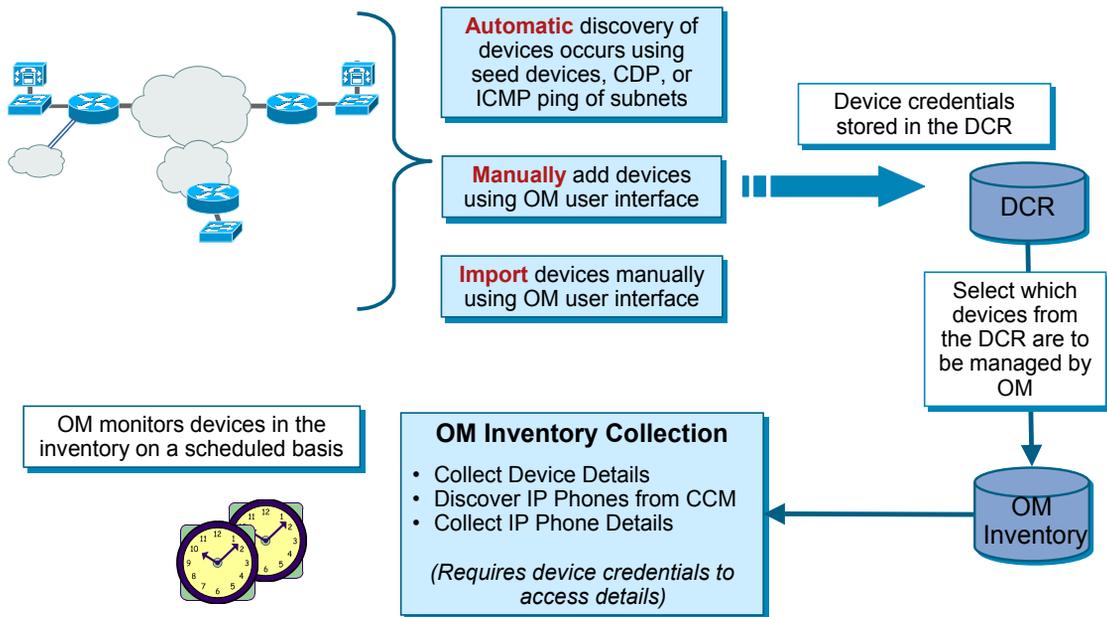
Operations Manager (OM) actually maintains two databases of device information: the Device and Credentials Repository (DCR) and the Operations Manager Inventory. The DCR provides a common database of devices and their access credentials for all installed Common Services based applications. This greatly simplifies the updating of devices and their credentials when used by more than one application. The Operations Manager Inventory is the collection of devices actually being managed by OM. It is a user-defined subset of the devices in the DCR.

Therefore, the first step is to populate the DCR, followed by selecting the devices in the DCR which should be added to the OM Inventory for management by OM. Devices can be added to the DCR in the following ways:

- Automatically through discovery using CDP information and SNMP queries or ICMP pings
- Manually - user provides device information
- Imported from a file or NMS system

# Inventory Management

## Populating the OM Inventory



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## Populating the OM Inventory

The administrator can select which devices are to be added to the OM Inventory for management. So when the DCR is populated, the OM inventory can be populated with the selected devices. The Inventory Collection process then accesses each device using the access credentials from the DCR to collect the management information needed. The administrator can schedule the inventory collection to reoccur on a periodic basis to keep the information up-to-date.

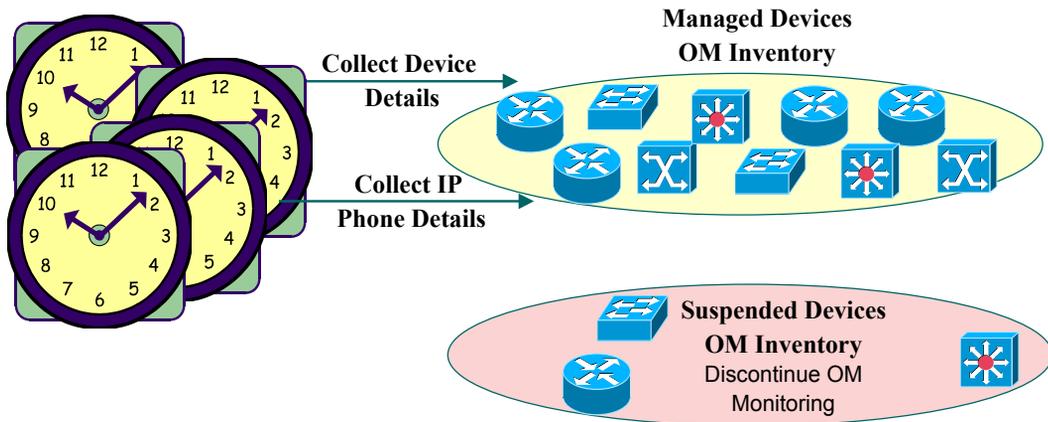
This entire process of inventory or device management is depicted above. Briefly summarizing, the device credential must be populated in the DCR either by discovery, manual add, or by importing them. Once in the DCR, the devices that the network manager wants to be managed by OM needed to be added to the OM inventory. Either all the devices from the DCR can be managed or the user can selected them. Once in the OM inventory, the collection schedules are defined and OM monitors these managed devices.

# Inventory Management

## Scheduling Inventory Collection

User can specify how often to collection information about the devices that are managed in the OM Inventory

- Specify how often to collect Device Details
- Specify how often to collect IP Phone Details



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## Scheduling Inventory Collection

Operations Manager collects data from monitored devices and updates the information about the devices themselves and the phones registered with managed devices. With Operations Manager, you can schedule inventory collection of devices and phones, configure Simple Network Management Protocol (SNMP) parameters, and access parameters for Lightweight Directory Access Protocol (LDAP) servers for obtaining assigned user names to IP Phones.

The collection of information is performed for all devices in the OM inventory. If at some point you do not want a device monitored, but still want to keep the device in the inventory, the device can be suspended from monitoring. A separate View is available for all suspended devices. As you see next, other views or device groups can be configured.

# Inventory Management

## Grouping of Devices for Easier Management

- View is a Logical Grouping of Devices or Device Group - Use to simplify the selection of devices for various operations and reports
- System (predefined) Device Groups
  - Pre-defined collection of devices (i.e. MDF device types)
  - Operations Manager has predefined System Groups related to Unified Communications components (I.e. Cisco CallManagers, Gatekeepers, 78xx Media Servers, IP SLA devices, and more)
- User Defined Device Groups
  - Membership based on set of rules or criteria
  - Membership can be Static (manually changed only) or Dynamic (automatically changed when membership rules are applied)
  - Groups can be Private (available to creator only) or Public (usable by all)



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## Grouping of Devices for Easier Management

Many Operations Manager (OM) tasks are executed against a set of devices. When thousands of devices are being managed, selecting specific devices for the task could be difficult. For instance, a thousand devices are being managed and a detailed hardware report needs to be run for only the 78xx Media Servers.

OM uses the concepts of groups to simplify the selection of devices. OM has several default grouping that categorize devices by MDF-types in a hierarchical manner (CCM Cluster > 78xx Media Server, Digital Voice Gateways, Gatekeepers, Voice Gateways, and Voice Mail Gateways). (MDF-type is the normative name for the device type as described in Cisco's Meta Data Framework (MDF) database).

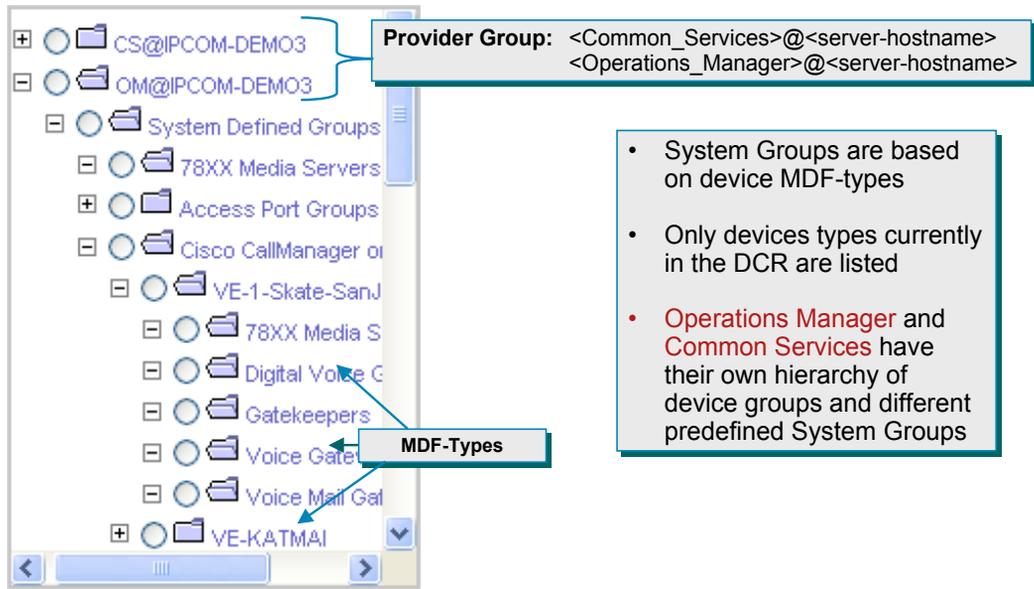
Users can create their own groups, too. These groups are created using a set of rules and can be configured to automatically populate based on adherence to the group rules or only with user intervention basically making for dynamic and static groups. Further, groups can be limited to only the creator of the group (private), or for use by all (public).

This powerful feature further simplifies the use of OM if meaningful groups are created. As previously mentioned, each device has 4 (or more) user fields associated with it (stored in the DCR) that can be used to help define groups. For example, User Field 1 could be assigned to device location. Then, a device group could be dynamically created based on the value of the location user field. Tasks can then be executed for devices belonging to a specific location.

When selecting devices for a task, these system-defined or user-defined groups can be used. A device can belong to multiple groups depending upon the definition of the group.

# Inventory Management

## Grouping of Devices – System Groups



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## Grouping of Devices - System Groups

Both Common Services and Operations Manager have their own System Groups that are populated as devices are added to the DCR or OM Inventory. In the case of Common Services, the system groups are based on device types: Routers, Switches, Hubs, Gateways, etc. In the case of Operations Manager, the system groups are based on Unified Communications capabilities: 78xx Media Server, Cisco CallManager, MGCP Gateway, IP SLA device, etc.

Illustrated above is an example of the system defined groups created by Operations Manager (OM).

### Tip:

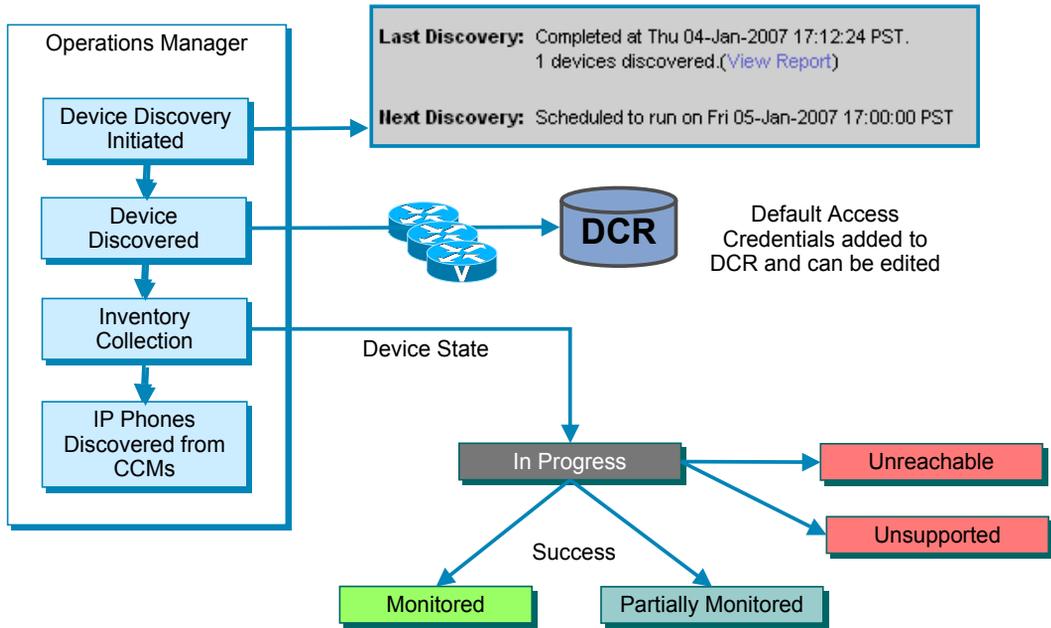
When using Operations Manager and selecting devices, use the defined groups under OM@<server\_name> to easily select devices by Unified Communications capability. Use the defined groups under CS@<server\_name> to select devices when they are simply plain routers and do not have any Unified Communications services.

### Note(s):

- Groups defined by any application are available for use by other applications.
- A device based system group will only be listed if a device of that type has been added to the DCR.
- These pre-defined groups come under the Provider Group (or the root group), which, by default, is of the format Application@server-hostname.
- A Provider Group will exist for each CiscoWorks application installed and is the parent for all the groups defined for a particular application.

# Inventory Management

## Device Management Status



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Features 2-52

## Device Management Status

Once the discovery process is started in OM or the scheduled discovery time occurs, the above discovery process is started.

As a device is discovered, either using the CDP information or detected using ping sweep, it is entered into the DCR along with the default discovery credentials.

Following the discovery of devices, information about the devices is collected. This is called Inventory Collection. Here, attributes about the device is collected using SNMP or HTTP. Collecting this information requires access credentials (stored in the DCR), such as SNMP community strings, SNMP v3 user name/password, or HTTP user name/password.

If the device is supported by Operations Manager and reachable using the access credentials, then the Inventory Collection is successful. The device state is reported as Monitored if all information is collected using the known access credentials. The device state may be reported as Partially Monitored if some information could not be retrieved using the known access credentials. For example, information about a Cisco CallManager requires the access credentials (user name / password) for HTTP and it may not have been specified; therefore, only the information that was retrieved using SNMP can be obtained; thus, Partially Monitored.

The Device Management: Summary page, illustrated next, lists the device states for all devices in the OM inventory and the number of devices that are in each device state.

# Inventory Management Status Reports

**Device States**

This report lets you view the monitoring status for the devices that were added to the OM inventory. (Refer to notes below for a description of each state.)

State	Number
Monitored:	148
Partially Monitored:	15
Monitoring Suspended:	0
Inventory Collection in Progress:	0
Unreachable:	43
Unsupported:	3
<b>Total Devices:</b>	<b>209</b>
<b>Total Phones:</b>	<b>356</b>

- Click **count** to view details of devices in that state or view IP phones discovered
- Click **Total Phones count** to view *All IP Phones Report* (example illustrated in next section - Reports)

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Features 2-53

## Status Reports

The Device Management: Summary page lists the device states for all devices in the OM inventory and the number of devices that are in each device state. Below are the different possibilities:

Monitored	The device has been successfully imported, and is fully managed by Operations Manager
Partially Monitored	The Cisco CallManager has been successfully imported by some of the data collectors in Operations Manager (i.e. SNMP), but not all; If a device is in this state, you should check HTTP credentials to ensure that the device becomes monitored
Monitoring Suspended	Monitoring of the device is suspended
Inventory Collection in Progress	Operations Manager is probing the device; This is the beginning state, when the device is first added; a device is also in this state during periodic inventory collection; Some of the data collectors may still be gathering device information
Unreachable	Operations Manager cannot manage the device; Could be because the device can't be pinged, SNMP service is not turned on, or the RO community provided by the user is incorrect
Unsupported	The device is not supported by Operations Manager

# Inventory Management

## Device Report (Available Per State)

**Cisco Unified Operations Manager**  
 Devices as of Fri 05-Jan-2007 08:09:20 PST; State: Monitored

Showing 1 - 20 of 41 records

	Device Type	Device Name	IP Address	Device Capabilities	Status	Monitored Since	Inventory Collection
1.	<input type="checkbox"/> Switch	tsbu-sw5.cisco.com	172.28.176.9	Phone Access Switch, IPSLA; Switch; Switches and Hubs	Monitored	Sat 16-Dec-2006 16:30:01 PST	Fri 05-Jan-2007 02:01:09 PST
2.	<input type="checkbox"/> Router	nmtg-demo-1712.cisco.com	192.168.159.242	Router; Routers	Monitored	Sun 17-Dec-2006 23:11:47 PST	Fri 05-Jan-2007 02:01:20 PST
3.	<input type="checkbox"/> Switch	nmtg-demo-3750pe.cisco.com	192.168.159.237	Phone Access Switch, IPSLA; Switch; Switches and Hubs	Monitored	Sun 17-Dec-2006 23:11:48 PST	Fri 05-Jan-2007 02:01:00 PST
4.	<input type="checkbox"/> Probe	nmtg-remote-2811-nm.cisco.com	192.168.137.90	Probe; Interfaces and Modules	Monitored	Sun 17-Dec-2006 23:11:48 PST	Fri 05-Jan-2007 02:01:18 PST

Select an item then take an action -->

Suspend device(s) to stop monitoring by OM Suspend

**Cisco Unified Operations Manager**  
 Fri 05-Jan-2007 08:14:36 PST; State: Partially Monitored

Select device name to obtain detailed device info

Not all information can be retrieved from the device

	Device Type	Device Name	IP Address	Device Capabilities	Status	Monitored Since	Last Inventory Collection
1.	<input type="checkbox"/> Host	nmtg-hq-pub.cisco.com	192.168.140.2	Media Server; VoiceServices; CiscoCallManager; Host; Voice and Telephony	Partially Monitored	Sun 17-Dec-2006 23:11:52 PST	Fri 05-Jan-2007 02:01:15 PST
2.	<input type="checkbox"/> VoiceServices; Unsupported; Voice and Telephony	nmtg-sj-cm-sec.cisco.com	192.168.137.4	Media Server; CiscoCallManager; VoiceServices; Unsupported; Voice and Telephony	Partially Monitored	Mon 18-Dec-2006 00:23:17 PST	Fri 05-Jan-2007 02:01:17 PST
3.	<input type="checkbox"/> Host	nmtg-sj-cm-pri.cisco.com	192.168.137.3	Media Server; CiscoCallManager; VoiceServices; Host; Voice and Telephony	Partially Monitored	Sun 17-Dec-2006 23:11:53 PST	Fri 05-Jan-2007 02:01:15 PST

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## Device Report

The Device Report lists the device details for the devices in the state that was selected. The report above (State: "All" ) is displayed when the count for the **Total Devices** is selected.

# Inventory Management

## Device Detail View

**Obtain details about the selected device**

Device Attribute	Information
1. System Name	NMTG-SJ-CCM-PRI
2. IP Address	192.168.137.3
3. MAC Address	00-0B-CD-CD-E7-8E
4. Device Capability	MediaServer, CiscoCallManager, VoiceServices, Host
5. First Discovered	Sat 17-Feb-2007 01:15:06 EST
6. Last Discovered	Sat 17-Feb-2007 01:15:06 EST
7. Description	Hardware: x86 Family 15 Model 2 Stepping 9 AT/AT COMPATIBLE - Software: Windows 2000 Version 5.0 (Build 2195 Uniprocessor Free)
8. Model	Media Server
9. Platform Name	COMPAG
10. System Contact	
11. System Location	
12. System Up Time	11 days 10:22:05
13. System Object ID	.1.3.6.1.4.1.311.1.1.3.1.2
4. Current State	Active

- OM uses Perfmon counter objects on CCM platforms to collect performance counters.
- Voice Utilization Settings, disabled by default, must be enabled to collect performance and capacity data.
- Refer to [Administration>Polling and Thresholds > Polling Parameters](#) for the device group

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## Device Detail View

The Device Detail View provides extensive information on the devices and device components for the device selected. You can view information on devices that Operations Manager is currently monitoring, as well as devices whose monitoring you have suspended.

- View hardware and software information on system, environment, connectivity, and interface components
- View hardware and software information on subcomponents of aggregate devices
- View application status for Cisco CallManager, Voice Services, Work Flow, and Synthetic Tests, and provide launch points for administrative pages, if appropriate
- Suspend or resume management of a device or a device component so the device is no longer polled, or polling is resumed

# Inventory Management

## Device IP Address Report

The screenshot shows the Cisco Unified Operations Manager interface. The main navigation bar includes 'Monitoring Dashboard', 'Diagnostics', 'Reports', 'Notifications', 'Devices', and 'Administration'. The 'Devices' menu is expanded, showing 'Device Management', 'Device Groups', and 'Device Credentials'. The 'IP Address Report' is selected in the left-hand navigation pane. The main content area displays a table titled 'IP Address Report' with 157 records. The table has the following columns: IP Address, DCR Display Name, Device Name, and Managed IP Address. The data rows are as follows:

	IP Address	DCR Display Name	Device Name	Managed IP Address
1.	192.168.159.242	192.168.159.242	nmtg-demo-1712.cisco.com	192.168.159.242
2.	192.168.140.82	192.168.140.82	192.168.140.82	192.168.140.82
3.	192.168.140.66	N/A	192.168.140.82	192.168.140.82
4.	172.28.176.141	172.28.176.141	tsbu-sys-ccm1.cisco.com	172.28.176.141
5.	172.20.112.248	N/A	rme-gw.cisco.com	172.20.119.1
6.	172.20.119.1	172.20.119.1	rme-gw.cisco.com	172.20.119.1
7.	172.20.112.249	N/A	rme-gw.cisco.com	172.20.119.1
8.	172.20.112.252	N/A	rme-gw.cisco.com	172.20.119.1
9.	168.17.1.1	N/A	rme-gw.cisco.com	172.20.119.1

When multiple IP addresses are used within a device, it can be difficult to recognize a device by the managed IP address or display name. This report helps by correlating these IP addresses.

## Device IP Address Report

The IP Address Report lists all the IP addresses of the devices that are added to the OM inventory. The IP address list includes both the IP addresses of the devices in the DCR (including devices that are not monitored by Operations Manager) and the IP addresses of all the devices in Operations Manager inventory.

The IP Address Report page displays the following:

- The IP addresses for all the devices in the DCR, but not in OM inventory. The IP Address Report may only display the IP address (if added) and the DCR display name.
- The IP addresses for all the devices in OM inventory.
- All the IP addresses known for each of the devices in OM inventory. If there is more than one IP address for a monitored device, all the IP addresses are displayed. The DCR Display Name column displays N/A and the Device Name and Managed IP Address columns will have the same entries for the corresponding device.
- Duplicate device entries from the DCR. If there is more than one entry for the same device in the DCR (this can occur by varying the DCR display name), the IP Address Report identifies the duplicate entries and appends the display names with the corresponding IP address entry in the DCR Display Name column.

**Note:** The duplicate entries in the DCR are identified by having more than one display name in the DCR Display Name column of the IP Address Report.



# Reports

- Operational Status Views
- Diagnostic Tests
- Inventory Management
- **Reports**
- Event Notification
- Customization / Advanced Features



# Standard Reports Overview

Report Type	Description
Alert and Event History	View stored information on past alerts and events
Service Quality History	View stored information on past service quality issues
IP Phones and Applications	View information about phones, installed applications and inventory changes. View reports on suspect and unregistered phones
Video Phones	View information about video enabled phones and inventory changes

- Reports can be a launch point for other tools
  - Diagnostic Tests
  - Drill down into device name for more details on the device (Configuration, Status, and Polling and Threshold Parameter Settings)
- Sort by column headings, export, or print
- User role of “Network Administrator” can view all reports. Check the Permissions Report for other user roles to view reports.

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## Standard Reports Overview

Operations Manager provides an extensive set of reports that help network managers maintain information about their Unified Communications deployment. The figure above illustrates the various types of reports from Operations Manager.

The historical alert, event, and service-quality reports maintain information about all the alerts and events reported by Operations Manager for up to 30 days. This enables network managers to document any past outage and have access to it for long-term trending purposes.

The IP phone inventory reports give network managers instant access to IP phone status information about every IP phone deployed in the network. Extensive information on signaling details and IP connectivity details is maintained and reported. These reports also track changes in phone status and thus serve to document move, add, and change operations on these IP phones.

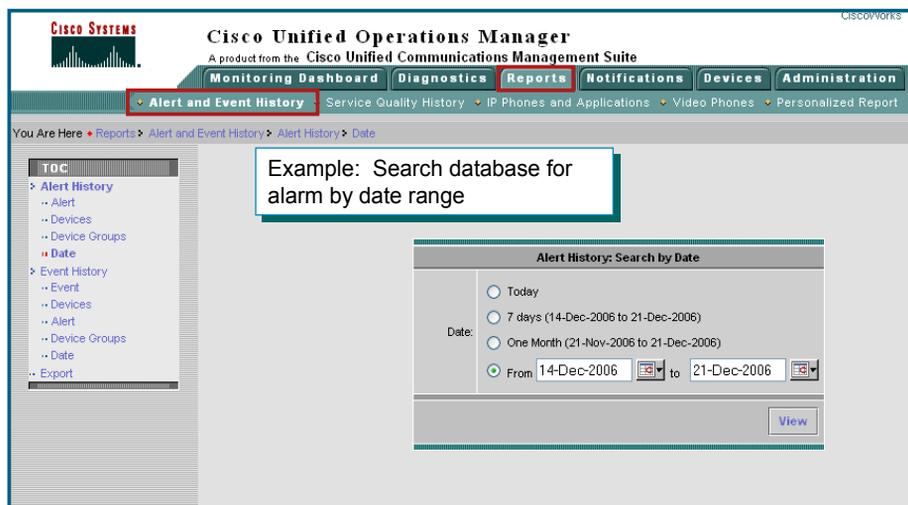
The customizable reports let network managers pick and choose what type of information they want and create a daily report that is available for them by e-mail or the Operations Manager user interface.

You may not be able to generate some of these reports if you do not have the required privileges. (Refer to the section on Customization and Advanced Features / Security for more information on user accounts and user privileges.)

# Standard Reports

## Alert and Event History

Customize searches according to what you are looking for, such as: alerts and events on certain devices, in a certain time period, or in a certain group



## Standard Reports – Alert and Event History

The Alert and Event History reports let you view stored information on past alerts and events. This information is stored in a database, and you can customize searches according to what you are looking for. Use this feature to search through the database to look for alerts or events according to their ID, that occurred on specific devices or device groups or within a specific date range.

# Standard Reports

## Alert History

Export to CSV or PDF  
Create Printer-friendly format  
Help

Showing 41-60 of 2000 records    Go to page: 3 of 100 pages

	Severity	Alert ID	Device Type	Device Name	Time	Description	Status
41.	Critical	00000WS	VoiceGateway	nmtg-remote-2811.cisco.com	21-Dec-2006 09:24:12	Utilization	Active
42.	Critical	00000WS	VoiceGateway	nmtg-remote-2811.cisco.com	21-Dec-2006 09:20:12	Utilization	Active
43.	Critical	00000RVW	Router	nmtg-hq-wan-3725.cisco.com	21-Dec-2006 09:20:10	Utilization	Active
44.	Critical	00000UK	MediaServer	gigantic-6.cisco.com	21-Dec-2006 09:20:10	Utilization	Active
45.	Informational	00000ZZ	MediaServer	nmtg-hq-pub.cisco.com	21-Dec-2006 09:11:46	Application	Cleared
46.	Critical	00000SB	MediaServer	nmtg-hq-sub.cisco.com	21-Dec-2006 09:11:44	Application	Active
47.	Critical	00000SM	MediaServer	nmtg-sj-ccm-sec.cisco.com	21-Dec-2006 09:11:41	Application	Active
48.	Informational	00000ZY	MediaServer	nmtg-sj-ccm-pri.cisco.com	21-Dec-2006 09:11:41	Application	Cleared
49.	Informational	00000ZX	MediaServer	austincm3.cisco.com	21-Dec-2006 09:11:39	Application	Cleared
50.	Critical						Active
51.	Informational						Cleared
52.	Critical						Active
53.	Critical						Active
54.	Critical						Active
55.	Critical						Active
56.	Critical						Active
57.	Critical						Active
58.	Critical						Active
59.	Critical						Active
60.	Critical						Active

Rows per page: 20    Go to page: 3 of 100 pages

The report displays a table (up to 2,000 records) detailing all of the alerts based on the criteria chosen; Sort by columns.

- Severity
- Alert ID
- Device Type
- Device Name
- Time of Occurrence
- Description
- Alert Status

## Standard Reports – Alert History

The Alert History report is a scrollable table that lists up to 2,000 records, based on your search criteria. To view database contents beyond the 2,000 records, click the **Export** tool button in the upper-right corner of the window.

The following information is displayed in this report:

- **Severity** – Critical, Warning, or Informational.
- **Alert ID** – Alert identifier number. Clicking this link opens the Event History report, which contains details about the events associated with the alert (see next page).
- **Device Type** – Note: Inventory Collection in Progress indicates that Operations Manager was discovering the device at the time of the alert. The actual device type is reflected when new events occur.
- **Device Name** - Device name or IP address
- **Time of Occurrence** – Date and time when the alert was generated.
- **Description** - Alert category, one of the following: Application, Connectivity, Environment, Interface, Other, Reachability, System Hardware, Utilization. For alerts containing multiple events, the report shows the category of the event with the most recent change.
- **Alert Status** - Based on last polling: Active, Cleared, Acknowledged

# Standard Reports

## Event History

**Cisco Unified Operations Manager Alert History** as of Thu 21-Dec-2006 11:53:53 PST

Showing 41-60 of 2000 records

Severity	Alert ID	Device Type	Device Name	Time	Description	Status
Critical	00000WS	VoiceGateway	nmtg-remote-2811.cisco.com	21-Dec-2006 11:53:53 PST		
Critical	00000WS	VoiceGateway	nmtg-remote-2811.cisco.com	21-Dec-2006 11:53:53 PST		

**Cisco Unified Operations Manager Event History** as of Thu 21-Dec-2006 11:57:23 PST

Showing 1-20 of 140 records

Event ID	Device Name	Device Component	Status	Alert ID
1. 0000Q7H	nmtg-remote-2811.cisco.com	IF-nmtg-remote-2811.cisco.com [CONNECTION TO NMTG-2811.cisco.com]	Active	00000WS
2. 0000Q7G	nmtg-remote-2811.cisco.com	IF-nmtg-remote-2811.cisco.com [CONNECTION TO NMTG-2811.cisco.com]	Cleared	00000WS
3. 0000Q7F	nmtg-remote-2811.cisco.com	IF-nmtg-remote-2811.cisco.com [CONNECTION TO NMTG-2811.cisco.com]	Cleared	00000WS
4. 0000Q7E	nmtg-remote-2811.cisco.com	IF-nmtg-remote-2811.cisco.com [CONNECTION TO NMTG-2811.cisco.com]	Cleared	00000WS
5. 0000Q72	nmtg-remote-2811.cisco.com	IF-nmtg-remote-2811.cisco.com [CONNECTION TO NMTG-2811.cisco.com]	Active	00000WS
6. 0000Q70	nmtg-remote-2811.cisco.com	IF-nmtg-remote-2811.cisco.com [CONNECTION TO NMTG-2811.cisco.com]	Cleared	00000WS

**EventID: 0000Q7H**

Property	Value	Status	Alert ID
Component	IF-nmtg-remote-2811.cisco.com/3 [Se0/0/0] [CONNECTION TO NMTG-REMOTE-7200]	Cleared	00000WS
Type	FRAMERELAY	Active	00000WS
MaxSpeed	128000	Active	00000WS
CurrentUtilization	45.992107 %	Active	00000WS
InputPacketRate	31.725 PPS	Cleared	00000WS
TrafficRate	7358.7373 BYPS	Cleared	00000WS
UtilizationThreshold	40	Active	00000WS
DuplexMode	FULLDUPLEX	Active	00000WS
OutputPacketRate	31.783333 PPS	Cleared	00000WS

## Standard Reports –Event History

Here is an example of the Event History report. This example was obtained by selecting the **Alert ID** in the Alert History report, which allows the user to view the event(s) that caused the alert on the device. This is just one way to generate this report. Using the **Reports> Alert and Events History** task can also generate Event History reports by searching the database using event criteria.

The Event History report lists events. For each event, the Event History report includes:

- Event ID link to open the Event Properties page and view current attribute or threshold values compared with the values at the time the event occurred (illustrated above)
- Device on which the event occurred
- Component on which the event occurred
- Time of the event
- Current status of the event based on last polling:
  - **Active** – Event is live.
  - **Cleared** - Event is no longer live. Also, when a device is suspended, all alerts are cleared. When Operations Manager polling determines that an alarm has been in the Cleared state for 30 minutes or more (from the time of polling), the alarm expires and is removed from the Alerts and Events display.
  - **Suspended** – Operations Manager is no longer monitoring the device.
  - **Resume** - Operations Manager is being configured to monitor the device again.

# Standard Reports

## Export Alert and Event History

The screenshot shows the Cisco Unified Operations Manager interface. The top navigation bar includes 'Monitoring Dashboard', 'Diagnostics', 'Reports', 'Notifications', 'Devices', and 'Administration'. The 'Reports' section is expanded to show 'Alert and Event History', 'Service Quality History', 'IP Phones and Applications', 'Video Phones', and 'Personalized Report'. The 'Alert and Event History' section is further expanded to show 'Alert History', 'Event History', and 'Export'. The 'Export' option is highlighted with a red box. A callout box below the screenshot states: 'Automatically generate 24-hour and 7-day reports daily and store them in CSV and PDF formats, with e-mail notification option'.

Automatically Export Alert and Event Reports	
	CSV PDF
Reports:	All alerts for the last 24 hours: <input type="checkbox"/> <input type="checkbox"/>
	All alerts for the last 7 days: <input type="checkbox"/> <input type="checkbox"/>
	All events for the last 24 hours: <input type="checkbox"/> <input type="checkbox"/>
	All events for the last 7 days: <input type="checkbox"/> <input type="checkbox"/>
Generate:	Every day at 12:00 AM
	Save at: C:\PROGRA~1\CSCOp\AlertEve
	E-mail to: <input type="text"/>
<input type="button" value="Apply"/>	

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## Standard Reports – Export Alert and Event History

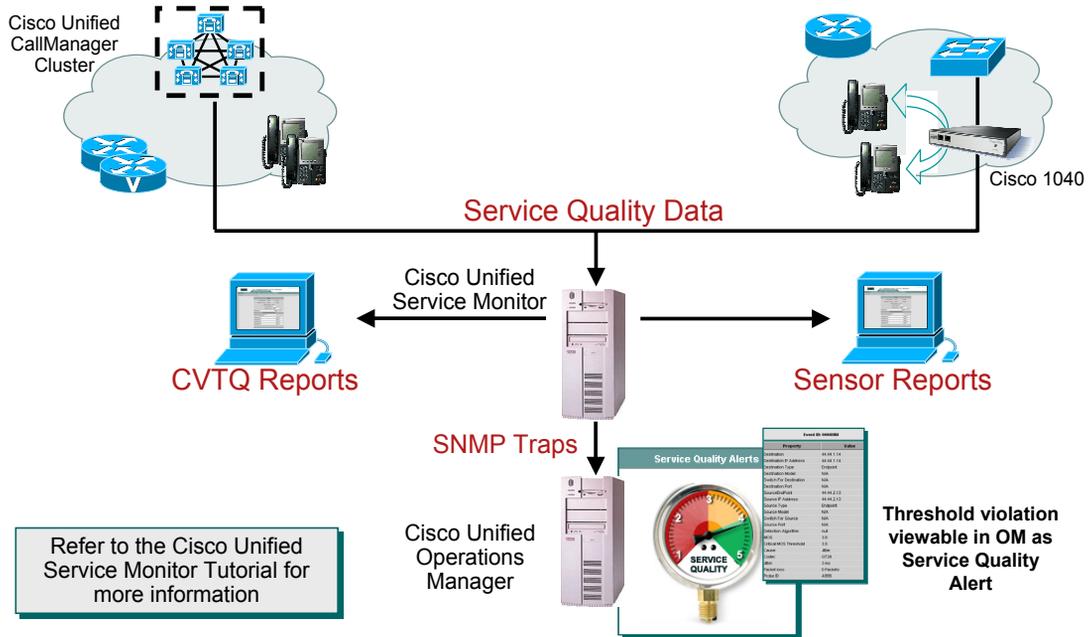
Alert and event reports can be generated on a scheduled basis at midnight to provide 24-hour and 7-day reports daily. (7-day weekly reports are generated on Mondays.)

The reports can be stored in CSV and PDF formats. OM can be configured to send an email notification to remind users that the reports have been generated and available for viewing.

- All alerts for the last 7 days--7-day reports are named AlertReports\_Weekly\_ddmmyyyy.filetype, for example AlertReports\_Weekly\_17Apr2006.pdf. 7-day reports run weekly on Monday at midnight.
- All events for the last 24 hours--24-hour reports are named EventReports\_Daily\_ddmmyyyy.filetype, for example EventReports\_Daily\_20Apr2006.csv.
- All events for the last 7 days--7-day reports are named EventReports\_Weekly\_ddmmyyyy.filetype, for example EventReports\_Weekly\_17Apr2006.pdf. 7-day reports run weekly on Monday at midnight.

# Standard Reports

## Service Quality Reports Overview



Refer to the Cisco Unified Service Monitor Tutorial for more information

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Features 2-63

## Service Quality Reports - Overview

As mentioned earlier in the Service Quality Alerts Dashboard section, Operations Manager can use the information provided by the Service Monitor application to present service-quality (quality-of-voice) alerts on a real-time basis. The service-quality alerts are associated with IP phones or Unified Communications devices that are currently monitored by Operations Manager and present that information in the Service Quality Alerts Dashboard.

Cisco Unified Service Monitor analyzes and reports on voice quality using Mean Opinion Scores (MOS) received from Cisco Unified CallManager clusters and Cisco 1040 Sensors.

This solution helps enable IP network and IP telephony managers to more effectively manage their IP communications infrastructure by providing near real-time quality of voice metrics and providing alerts when the voice quality falls below a user-defined threshold.

- Cisco 1040 Sensor – A hardware appliance or probe used to monitor quality of voice for up to 100 active RTP streams per minutes. The sensor then forwards a quality of voice metric in the form of a Mean Opinion Score (MOS) for each monitored stream every 60 seconds to the Service Monitor server.
- Cisco Unified CallManager – stores the CVTQ data from gateways and phones in Call Detail Records (CDRs) and Call Management Records (CMRs), which is then sent or retrieved by Service Monitor.
- Service Monitor Server – Compares the quality of voice metrics incoming from the Cisco 1040s to a user-defined threshold. If a threshold violation is detected, Service Monitor will forward a SNMP trap containing the pertinent information to as many as four trap recipients. Service Monitor can also optionally archive all incoming call metrics, and is used to manage the Cisco 1040 sensors.

*For more information on the Cisco 1040 Sensors and Service Monitor, refer to the Service Monitor tutorial or Chapter 5 for online links.*

# Standard Reports

## Service Quality History

- Search history database according to what you are looking for
- Setup Operations Manager to automatically export the information.

Example: Search database for service quality events based on MOS value

Search by:

- MOS less than x
- Destination (Is or contains)
- Codec Value
- Phone type
- From a 1040 Sensor
- On a date

Service Quality reports can also be exported 24-hour and 7-day reports

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## Service Quality History Report

The Service Quality History report is a scrollable table that lists up to 2,000 records, based on your search criteria. To view database contents beyond the 2,000 records, click the **Export** tool button in the upper-right corner of the window.

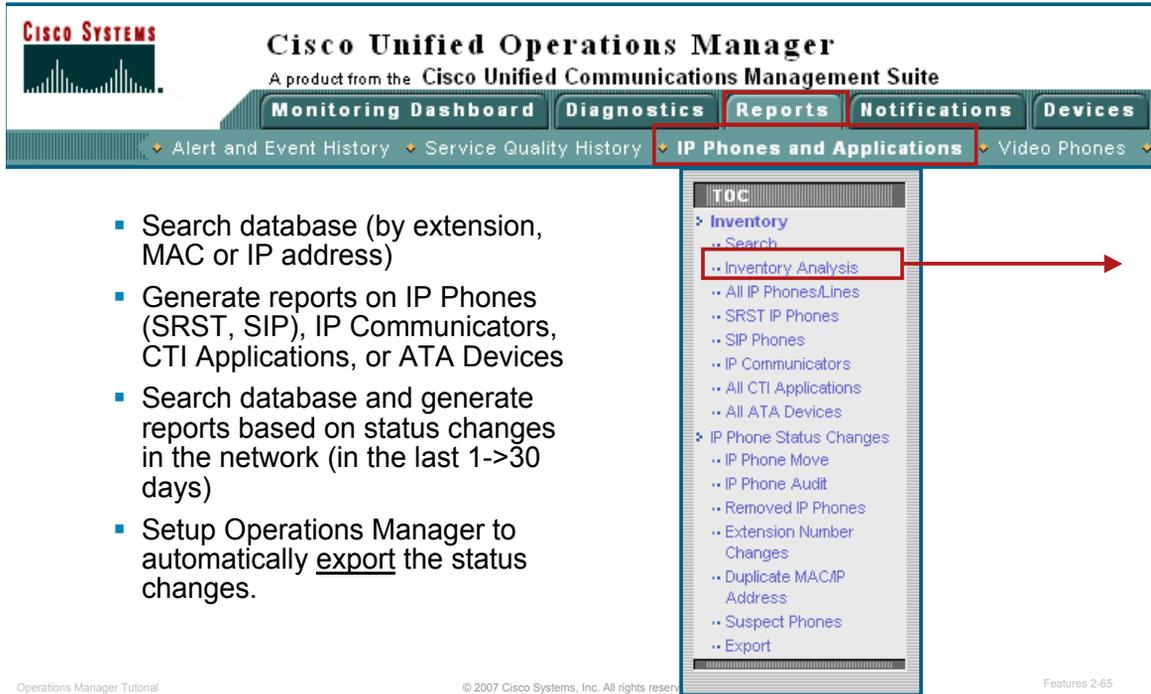
Use the search criteria in the TOC to search the database for service quality events based on the criteria selected. The report provides information on the following:

- Event Severity
  - Warning--MOS is below the MOS threshold configured on Service Monitor.
  - Critical--MOS is below the MOS threshold configured on Operations Manager.
- Event ID - Click this link to open the event properties window.
- Destination Type: Endpoint or IP Phone
- Destination - IP address or phone extension.
- IP Address - Destination IP address.
- MOS - Mean Opinion Score that triggered the event.
- Cause - One of the following: Jitter or Packet Loss
- Time - Date and time that the event occurred.
- Codec - One of the following: G711, G722, G728, G729
- Source Type - One of the following: Endpoint or IP Phone
- Source - IP address or phone extension.
- IP Address - Source IP address.

You may not be able to generate some of these reports if you do not have the required privileges. (Refer to the section on Customization and Advance Features / Security for more information on user accounts and user privileges.)

# Standard Reports

## IP Phones and Applications



**Cisco Unified Operations Manager**  
A product from the Cisco Unified Communications Management Suite

Monitoring Dashboard | Diagnostics | **Reports** | Notifications | Devices

Alert and Event History | Service Quality History | **IP Phones and Applications** | Video Phones

**TOC**

- > Inventory
  - .. Search
  - .. Inventory Analysis**
  - .. All IP Phones/Lines
  - .. SRST IP Phones
  - .. SIP Phones
  - .. IP Communicators
  - .. All CTI Applications
  - .. All ATA Devices
- > IP Phone Status Changes
  - .. IP Phone Move
  - .. IP Phone Audit
  - .. Removed IP Phones
  - .. Extension Number Changes
  - .. Duplicate MAC/IP Address
  - .. Suspect Phones
  - .. Export

- Search database (by extension, MAC or IP address)
- Generate reports on IP Phones (SRST, SIP), IP Communicators, CTI Applications, or ATA Devices
- Search database and generate reports based on status changes in the network (in the last 1->30 days)
- Setup Operations Manager to automatically export the status changes.

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## Standard Reports – IP Phones and Applications

Many reports exist for reporting on IP Phones. The upcoming pages provide examples of these reports.

In addition to reports, Operations Manager has the feature to search its database to locate IP phones in the network. You can search for phones using all or only part of an extension number, IP address, or MAC address. The Search Inventory feature provides a quick pop-up window for each phone that matches the criteria. To search for phones using more attributes (i.e. VLAN, phone status, SRST, phone model, CCM address or cluster, connecting switch or SRST router address) or to obtain a full report on phones matching the criteria, use the Inventory Analysis report feature.

Note(s):

- If you are unable to see information about an IP phone, either the switch or the Cisco CallManager with which the phone is associated to, is not monitored by Operations Manager. To correct this, either add the unmonitored switch or CCM to the Operations Manager inventory or if in the inventory, check the status or reachability of the device.
- For the Cisco Wireless IP Phone 7920 to be monitored in Operations Manager, its Aironet access point must also be monitored by Operations Manager. Only the logical information from the Cisco CallManager will be displayed for this phone. All the switch information for the 7920 will appear as Not Available.
- If Cisco IP Soft Phone records do not appear, generate the IPT Applications Details display.

Now let's look at an example of how to generate an inventory report by analyzing the database.

# Standard Reports

## IP Phones and Applications – Inventory Analysis

Find IP Phones

Find IP Phones Where: IP Address begins with 192.168

VLAN Name:

VLAN ID:

IP Phone Status:  Registered  Unregistered  All

SRST Status:  SRST  Non-SRST  All

Protocol:  SCCP  SIP  All

IP Phone Type: 7902, 7905, 7910, 7912, 7920, 7935, 7936, 7941

CCM/CCM Cluster/CME:  Exclude

Switch:  Exclude

SRST Router:  Exclude

Device Selector – select from managed list to include or exclude phones from report

View Cancel

Find IP Phones in the managed inventory and generate a report based on:

- Extension, MAC or IP address
- VLAN name or ID
- Status
- SRST Status
- Protocol (SCCP, SIP)
- Phone model
- Cluster
- Connecting switch
- SRST router

## Standard Reports – IP Phones and Applications – Inventory Analysis

Use the **Reports> IP Phones and Applications** task to search the database based on defined criteria: properties or status changes, as illustrated above.

The dialog offers a variety of parameters in which to search the phone inventory. For this example, the **IP Address** attribute is selected from the “Find IP Phones Where” pull down list. Select **begins with** from the next pull down list, and enter 192.168 in the third box.

# Standard Reports

## IP Phones and Applications – Inventory Analysis

The screenshot shows the Cisco Unified Operations Manager interface for the 'Inventory Analysis' report. The report displays a table of 22 records, with the first 12 visible. The table columns are: Extn., User, IP Address, MAC Address, Model, Regd., CCM/CME Address, Switch Address, and Port. A 'Column Selector' dialog box is open, allowing users to customize the report by adding or removing columns. The dialog shows a list of 'Hidden Column(s)' and 'Displayed Column(s)'. The 'Displayed Column(s)' list includes: CCM/CME Address, Extn., IP Address, MAC Address, Model, Port, Regd., Switch Address, and User. Below the table, there are buttons for 'SRST Test', 'Synthetic Test', and 'Phone Status Test', along with a 'Launch' dropdown menu. A text box highlights that selecting one or more phones (checkboxes) allows launching a test on them.

	Extn.	User	IP Address	MAC Address	Model	Regd.	CCM/CME Address	Switch Address	Port
1.	N/A	N/A	192.168.137.75	0003e333fed7	7960	N/A	N/A	192.168.137.24	Fa1/0/14
2.	N/A	N/A	192.168.140.20	00036b8b0975	7960	N/A	N/A	192.168.140.14	Fa0/9
3.	101	N/A	0.0.0.0	0114a577102d	7971	no	192.168.140.49	N/A	N/A
4.	1021	Auto 1021	192.168.137.5	00036b7fff1e	7960	yes			
5.	2004	N/A	0.0.0.0	456ddada92bb	7960	no			
6.	2507	Auto 2507	192.168.137.59	0009b7da03da	7960	yes			
7.	3000	Auto 3000	192.168.137.38	0003e348e5b9	7960	yes			
8.	3001	Auto 3001	192.168.137.40	0002fd659a33	7960	yes			
9.	3004	Auto 3004	192.168.137.36	0009b7542268	7960	yes			
10.	3456	N/A	0.0.0.0	000111222335	7971	no			
11.	3539	Auto 3539	192.168.137.77	00036be7b3df	7960	yes			
12.	3540	Auto 3540	192.168.137.76	0003e3340785	7960	yes			

## Standard Reports – IP Phones and Applications – Inventory Analysis

As can be seen by the report above, the listed phones all have IP addresses beginning with 192.168.

Like most phone-based reports, you can select certain phones and launch diagnostic tests.

Also, notice the Tools icon. This allows you to customize reports by adding and/or removing columns from the report, as illustrated above.

# Standard Reports

## Filtering: All IP Phones / Lines Report

Filter All IP Phone/Lines Report



Easily find a IP phone using the **Filter** feature on the reports

**Filter**

Find Phones where: Extension  is exactly

VLAN Name:

VLAN ID:

IP Phone Status:  Registered  Unregistered  All

SRST:  SRST  Non-SRST  All

IP Phone Type: 7902, 7905, 7910, 7912, 7920, 7935, 7936, 7941

CCM/CME:  Exclude

Switch:  Exclude

SRST Router:  Exclude

Locate extension



### IP Communications Operations Manager

All IP Phones/Lines as of Sat 14-Jan-2006 08:52:22 PST



Showing 1 - 1 of 1 records

Sort report by clicking on columns

<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
1. <input type="checkbox"/>	4103	Bill	172.20.119.65	0013717aa8aa	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

Rows per page: 20

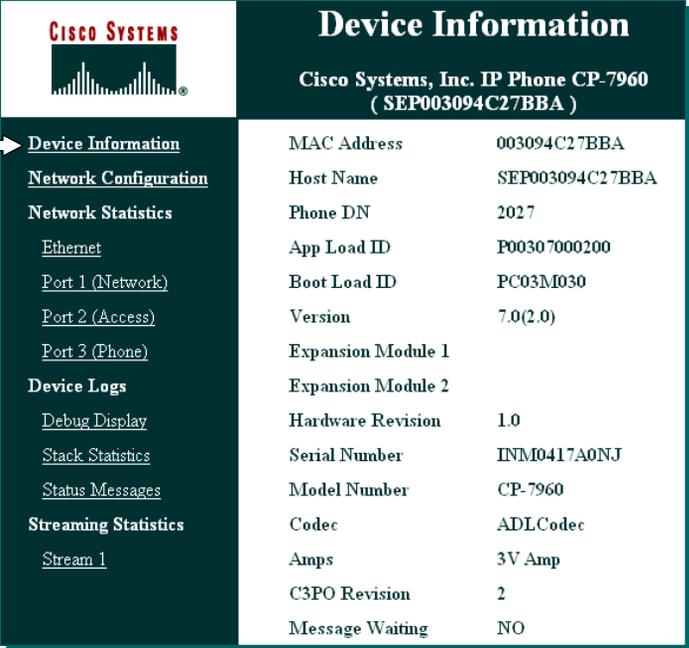
## Filtering: All IP Phones/ Lines Reports

The **All IP Phones/Lines Report** lists all IP phones, including IP Communicators and IP phones that are configured for SRST. Use the **Filter** feature to include only the phones that you want to see.

Additionally, the operator could also sort the list (ascending or descending) by clicking on the column headings one or more times.

# Standard Reports

## Example: IP Phone Web Interface



The screenshot displays the Cisco Systems IP Phone Web Interface. The top left features the Cisco Systems logo. The main header reads "Device Information" and "Cisco Systems, Inc. IP Phone CP-7960 (SEP003094C27BBA)". The sidebar on the left contains the following links: [Device Information](#), [Network Configuration](#), [Network Statistics](#), [Ethernet](#), [Port 1 \(Network\)](#), [Port 2 \(Access\)](#), [Port 3 \(Phone\)](#), [Device Logs](#), [Debug Display](#), [Stack Statistics](#), [Status Messages](#), [Streaming Statistics](#), and [Stream 1](#). The main content area displays the following device information:

MAC Address	003094C27BBA
Host Name	SEP003094C27BBA
Phone DN	2027
App Load ID	P00307000200
Boot Load ID	PC03M030
Version	7.0(2.0)
Expansion Module 1	
Expansion Module 2	
Hardware Revision	1.0
Serial Number	INM0417A0NJ
Model Number	CP-7960
Codec	ADLCodec
Amps	3V Amp
C3PO Revision	2
Message Waiting	NO

To the right of the main content area, a box titled "IP Phone Web Interface" contains the following instructions:

- From any report, click on a phone's extension number, IP or MAC address
- This takes you directly to the IP phone's web interface
- Access the phone's configuration, logs, and statistics

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## Standard Reports – Example: IP Phone Web Interface

To open an IP phone web interface from any report, click one of the following hyperlinks:

- Extension number
- IP address
- MAC address

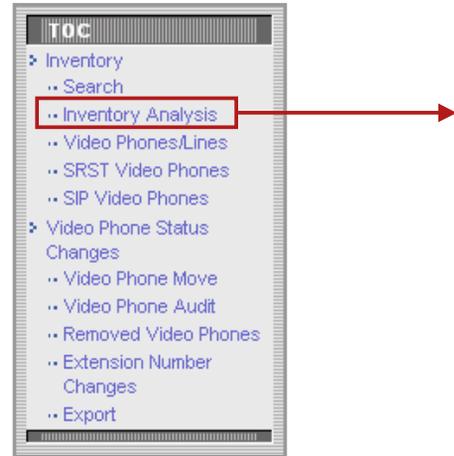
Another window opens with information directly from the phone, including network configuration details, device, port, and Ethernet information for the specified IP phone.

# Standard Reports

## Video Phones



- Search database (by extension, MAC or IP address)
- Generate reports on Video Phones (SRST, SIP)
- Search database and generate reports based on status changes in the network (in the last 1->30 days)
- Setup Operations Manager to automatically export the status changes



## Standard Reports – Video Phones

Video Phones reports provide two types of reports: inventory and video phone status change:

- **Inventory reports** - Provide detailed video phone data, reflecting the current status of Video Phones in your network. Search for a few video phones; list a specific set of video phones--such as phones connected to a switch or phones in SRST mode--or view all video phones and lines:
  - Search--Use Search to view information for a few video phones or a single video phone; search enables you to find phones using all or part of an extension number, IP address, or MAC address.
  - Inventory Analysis--Use the Inventory Analysis report to display Video Phones that meet criteria that you specify; for example, Video Phones that are registered to a particular Cisco Unified CallManager or Video Phones that are not connected to particular switches.
  - Video Phones/Lines--Use the Video Phones/Lines report to view data for all Video Phones that Operations Manager is monitoring.
  - SRST Video Phones--Use the SRST Video Phones report to view data for Video Phones that are configured for Survivable Remote Site Telephony (SRST) only. Video Phones that are configured for SRST are also included in the All Video Phones/Lines report and can be included in the Inventory Analysis report.
  - SIP Video Phones--Use the SIP Video Phones report to view data for all SIP Video Phones that Operations Manager is monitoring.
- **Video Phone Status Changes** reports - Video phones that have undergone a status change during the previous 1 to 7 days:
  - Video Phone Move--View data for phones that have been connected to a different switch or switch port or that have registered to a different Cisco Unified CallManager.
  - Extension Number Change
  - Removed Video Phones
  - Video Phone Audit--Obtain a summary of changes, including data for phones that have moved, been removed, undergone an extension number change, appeared in inventory with a duplicate MAC or IP address, or become suspect.

# Standard Reports

## Video Phones Example

The screenshot shows the Cisco Unified Operations Manager interface. The title is "Cisco Unified Operations Manager Inventory Analysis" with a timestamp "as of Mon 15-Jan-2007 08:09:38 EST". The report shows "Showing 1 - 2 of 2 records". The table has the following columns: Extn., User, IP Address, MAC Address, Model, Regd., CCM CME Address, Switch Address, and Port. Two records are listed, each with a checkbox in the first column. Below the table, there is a "Rows per page" dropdown set to 20 and a "Go to page" field set to 1 of 1 Pages. A "Launch" button is visible, and a dropdown menu is open showing "SRST Test", "Synthetic Test", and "Phone Status Test".

	Extn.	User	IP Address	MAC Address	Model	Regd.	CCM CME Address	Switch Address	Port
1.	<input type="checkbox"/>	1000 room1 (1000)	172.20.233.168	0014a8ff3233	Telepresence	yes	172.28.176.142	N/A	N/A
2.	<input type="checkbox"/>	1004 room3 (1004)	172.20.233.165	0014a8ff323c	Telepresence	yes	172.28.176.142	N/A	N/A

Select one or more phones  
(checkbox) to launch a test on them

## Standard Reports – Video Phones Example

Above is an example of a Video Phones report using the Inventory Analysis option.

Like most phone-based reports, you can select certain phones and launch diagnostic tests.

Also, notice the Tools icon. This allows you to customize reports by adding and/or removing columns from the report, as illustrated above.

The export feature in the TOC (previous page) is also available for Video Phone reports.

# Personalized Reports Overview



- Operations Manager allows you to create a personalized view of the data associated with key elements such as devices, IP phones, and diagnostic tests
- Also provides system-wide information about added and removed devices and phones
- To create and view a personalized report:
  - Configure/define the contents
  - Export (schedule) the report
  - Select a report and view it

## Personalized Reports - Overview

The Personalized Report enables you to configure a report that includes devices, IP phones, and diagnostic tests that interest you. You can create one personalized report per user.

To create a personalized report, use the **Reports > Personalized Reports** menu, and follow these steps:

1. Determine what you would like the report to display. A single report can contain managed devices, IP phones, and OM diagnostic tests that have already been defined.
  - a. To add managed devices to the report, select the **Devices** radio button in the Configure pane. The Device Selection dialog will appear. Open the tree hierarchy to select one or more device groups to select or individual devices.

*When you have the device(s) that you want in the report, click **Save** to save your selections.*
  - b. To add managed IP phones to the report, select the **Phones** radio button in the Configure pane. (If phones have already been added to the report, they will be listed here.) Click Add to add phones manually (Known List) or by selecting the phones from the Phone Report. To manual add phones, click Known List and for each phone, enter its MAC, IP and Extension separated by a ",". Multiple phone records must be separated by a ";".

When you have the IP Phone(s) that you want in the report, click **Save** to save your selections.
  - c. To add Diagnostics Tests to the report, the tests must already be configured and then can be selected by clicking the radio button for the appropriate test type.

When you have the test(s) that you want in the report, click **Save** to save your selections.

At any time, you can click **View** to see a summary of your selections (devices, phones, or tests)

2. Next, export or schedule the report so that it may be viewed.

# Personalized Reports Example

Reports > Personalized Report > View Report

**Personalized Report**  
Summary since installation ending Wed 01-Mar-2006 17:00:00 PST

**For Selected Elements**

Devices: 9 monitored devices, 497 new alerts (348 Critical) [View](#)

Phones: 3 monitored phones, 0 lost connectivity, 0 phones moved [View](#)

Tests: Phone Status: 0 tests configured successfully, 0 phones are not reachable  
Synthetic: 0 tests configured successfully, 0 failed  
Node-to-Node: 1 tests configured successfully, 0 failed, 164 threshold violations [View](#)

**For Entire System**

Devices: 165 devices added, 0 devices removed [View](#)

Phones: 0 phones added, 0 phones removed (to/from the monitored CCMs/CMEs) [View](#)

**Cisco Unified Operations Manager**  
Device Report generated on Wed 01-Mar-2006 17:00:00 PST

**Selected Devices Details**

Device Name	IP Address	Status	First Added	Last Discovered	Alert Severity
ccm-sub-2.cisco.com	172.19.241.70	Partially Monitored	Tue 21-Feb-2006 19:30:04 PST	Tue 28-Feb-2006 02:02:50 PST	Not Applicable
ntg-br-ccm-pri.cisco.com	192.168.137.99	Monitored	Tue 21-Feb-2006 19:02:19 PST	Tue 28-Feb-2006 02:04:30 PST	Critical
ccm-sub-1.cisco.com	172.19.241.12	Monitored	Tue 21-Feb-2006 19:30:04 PST	Tue 28-Feb-2006 02:02:47 PST	Not Applicable

**Alerts**

Severity	Alert ID	Device Type	Device Name	Latest Event Time	Latest Event Description	Alert Age	Status
Critical	1007	VoiceGateway	la-3745-cme.cisco.com	Tue 21-Feb-2006 19:23:30 PST	Interface	189 hrs. 36 mins.	Active
Critical	1007	VoiceGateway	la-3745-cme.cisco.com	Tue 21-Feb-2006 19:23:30 PST	Interface	189 hrs. 36 mins.	Active
Informational	1074	MediaServer	sjc-cer-1.cisco.com	Tue 28-Feb-2006 16:19:15 PST	ManualClear	24 hrs. 40 mins.	Cleared

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**24-Hour Event History**

Event ID	Device Type	Device Name	Device Component	Event Description	Time	Status	Alert ID
000050	Host	nrntg-br-ccm-pri.cisco.com	192.168.137.99 [nrntg-br-ccm-pri.cisco.com]	Unresponsive	Wed 01-Mar-2006 00:00:00 PST	Cleared	000000U
000050V	Host	nrntg-br-ccm-pri.cisco.com	VNEM-nrntg-br-ccm-pri.cisco.com/5	InsufficientFreeVirtualMemory	Wed 01-Mar-2006 00:00:00 PST	Active	000000U

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## Personalized Reports – Example

After you have configured (defined the contents of) your personalized report, scheduled (or exported) it, and after the execution time has passed, you can then view the personalized report

From the **Reports** tab, select the **Personalized Report** option. Select the **View Report** task from the TOC. A **View** button will be displayed for each type of component. Click the appropriate one to see the data. As can be seen in the report above, the device report provides basic information about each device selected during the configuration of the report and any associated alert information.

The personalized report also includes two system inventory reports detailing the change to the device and phone inventories since the last execution of the report.

*<Intentionally Blank>*



# Event Notification

- Operational Status Views
- Diagnostic Tests
- Inventory Management
- Reports
- **Event Notification**
- Customization / Advanced Features



# Event Notification Services

## Terminology



- **What is a Notification?**
  - An E-mail, Syslog message, or SNMP trap alerting a user to an event
- **How can Notifications be limited to specific devices or events?**
  - Define the [Device-Based Notification Criteria](#) (reasons to generate a notification)
  - Use Event Sets in the criteria definition to further limit which events are monitored and would trigger a notification
- **How can Notifications be limited to specific Service Quality Alerts?**
  - Define the [Service Quality-Based Notification Criteria](#)
- **How do I configure Notifications?**
  - Operations Manager has a wizard-based dialog to help define all parameters
  - Define when, during the day, events should be monitored for notification; define what type of notification to send (e.e. E-mail, Syslog, or trap); and define who or which device should receive the notification

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## Event Notification Services

As you have seen earlier in this chapter, Operations Manager displays alerts in response to events that occur in the Unified Communications environment and the IP fabric. These alerts can be viewed in the Monitoring Dashboards, such as the Alerts and Events display. In addition, using the Notification Services in Operations Manager, you can configure Operations Manager to forward information about *specific* alerts and events to SNMP trap daemons on other hosts, Syslog daemons, and users using email.

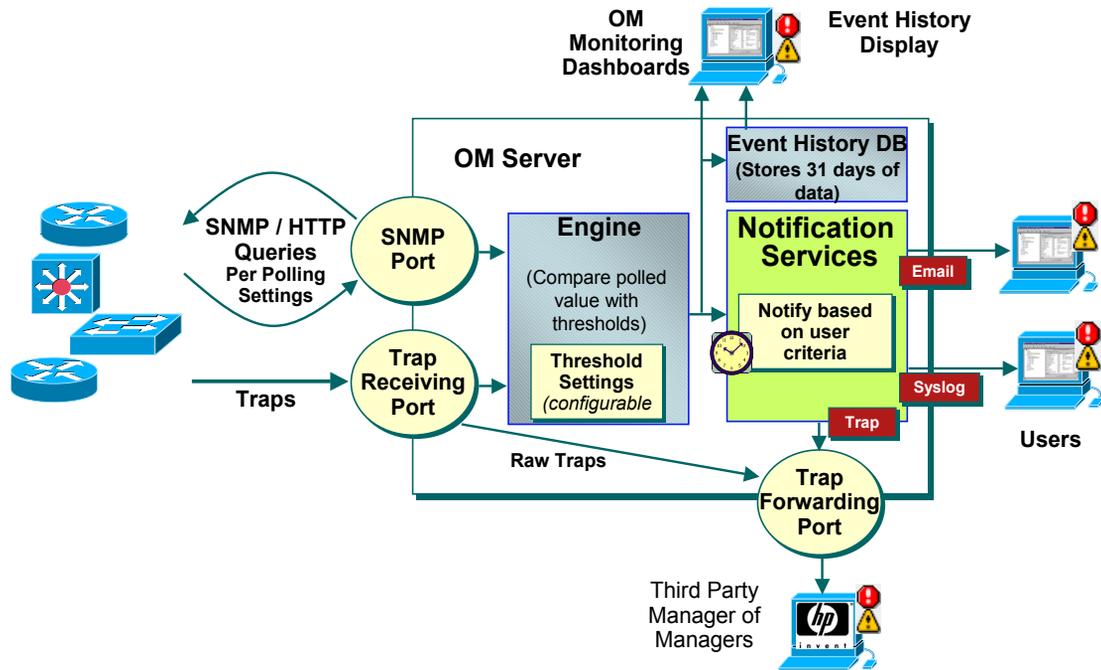
The receipt of an e-mail, Syslog message, or SNMP trap alerting a user or device of an event is called a *Notification*. The criteria that causes a notification can be defined by selecting the event sets that would cause a notification and then by selecting additional matching criteria for the event set. Operations Manager supports two types of notification criteria: Device-based and Service Quality- based (discussed shortly).

### Note(s):

- Using the [Event Customization](#) task, you can also customize the names and severity of the device-based events displayed by Notifications. (Refer to the next topic in this chapter, “Customization Features”.)

# Event Notification Services

## Overall Functional Flow



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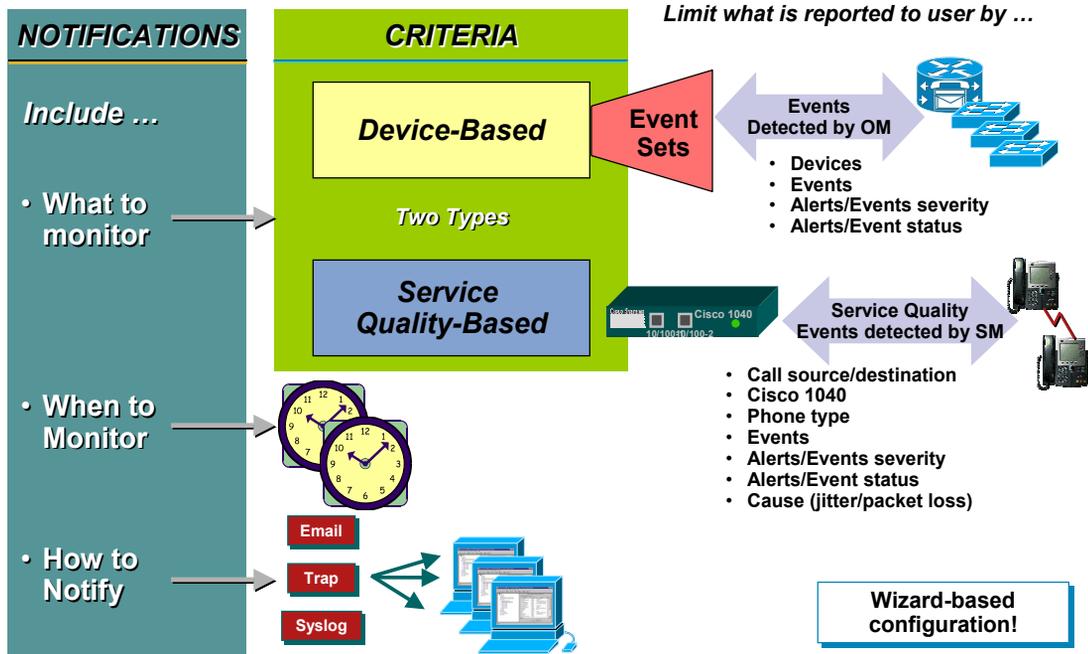
## Event Notification Services– Internal Functional Flow

The Alerts and Event display is one of the main ways to use Operations Manager on a day-to-day basis, but would require constant visual contact to be alerted to changes in the state of the network. To free the network administrators from 24/7 visual contact with the Alerts and Events display, Operations Manager allows for alternate means to notify personnel – E-mail, SNMP traps, and Syslog message. Each of these notification mechanisms would provide a summary of the alert/event. The receiver of the notification could then return to Operations Manager for more details.

Notifications are sent based on subscriptions to notification groups. Basically a notification group is a set of events and alerts occurring on a set of devices. This allows for different recipients or notification mechanisms for different devices and alerts for ultimate notification flexibility.

# Event Notification Services

## Defining Notification Services Within OM



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## Defining Notification Services Within Operations Manager

To define notification services in OM, you need to define a subscription to notification services. The subscription is monitoring alerts and events between a timeframe, and if the alert or event matches the notification criteria, the subscription will send out an E-mail, trap, or Syslog message to one or more recipients.

But before you can define the subscription in OM, you need to define the notification criteria which can be either device-based or service quality based. If it is device-based, you also have the option before defining the notification criteria, to define Event Sets.

For example, in some cases, you might want to send notifications for only a subset of the events that Operations Manager monitors. You can set the events that are of interest to you when you define the notification criterion:

- Specify an event set for a device-based notification criterion. You can create as many events sets as you would like.
- Select the events that you want Operations Manager to monitor for Service Quality-based notification criteria. There are few Service Quality-based events and you can select among them when you add or edit Service Quality-based notification criteria.

Let's show you how these components are defined in OM.

# Event Notification Services

## Event Sets (Optional for Device-Based Criteria)

Optionally, use **Event Sets** limit which events are monitored and would trigger a **Device-based** notification

Events Sets Already Defined

Event Sets

Showing 2 records

		Name	Description	
1.	<input type="checkbox"/>	All_Events	All Events	<b>Default</b>
2.	<input type="checkbox"/>	CCMdown		<b>User defined</b>

**Add** Edit View Delete

See next slide

- All Events (System Default – contains every event type)
- Optionally, create your own (Example: CCMdown monitors if CCM or CME is down )

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## Event Sets (Optional)

Event sets enable you to group the events the you want Operations Manager to monitor for the purpose of sending notifications. Use event sets to:

- Limit the number of events that Operations Manager notification monitors. When you do not use event sets, Operations Manager notification monitors all events to determine whether to send a notification.
- Aggregate the notifications that you want to send to different destinations. For example, you can create separate event sets for each of the following purposes:
- Limit the amount of e-mail notification sent to specific individuals or departments to only those for certain events.
- Write all occurrences of particular events to Syslog.
- Send SNMP traps when certain events occur.

### Note(s):

- When you create device-based notification criteria (discussed shortly), you must include an event set as one of the criteria.
- The default event set, *All\_Events*, includes all events.

# Configuring Notification Services

## Event Sets (Optional), (Cont.)

**Event Set: Add**

Event Set Name: CCMEEExceeded

Event Set Description:

Showing 144 records

Selected Events

13.	<input type="checkbox"/>	CCMEEphoneRegistrationFailed
14.	<input checked="" type="checkbox"/>	CCMEEphoneUnregistrationsExceeded
15.	<input type="checkbox"/>	CCMEKeyEphoneRegistrationChange
16.	<input type="checkbox"/>	CCMELivefeedMOHFFailed
17.	<input checked="" type="checkbox"/>	CCMEMaximumConferencesExceeded
18.	<input type="checkbox"/>	CCMENightServiceChange
19.	<input type="checkbox"/>	CCMEStatusChange
20.	<input type="checkbox"/>	CCMHttpServiceDown

OK Cancel

Create New Event Set

Select a set of events to be reported on

## Event Sets (Optional) – Defining a New Event Set

If you want to use event sets to limit the events to be notified on, use the Add button, as shown on the previous page. Enter a meaningful name and description for the event set. Click the events listed in the Selected Events portion of the dialog that you wish to include in this event set. These are the events you will be notified about. You will then be able to select this new event set when defining Device-based Notification Criteria (discussed next).

# Event Notification Services

## Notification Criteria

**Notification Criteria** defines what you want to monitor for the purpose of sending notifications

**Types of Notification Criteria**

- Device-Based Criteria (can use Event Sets)
- Service Quality-Based Criteria

See next slides

Wizard-based configuration of notification criteria

Name	Devices/Device Groups	Events	Destinations	Operating Interval	Status
1. CallManager	Cisco CallManager or Cluster/VE-SJ-TME-CLUSTER/78XX Media Servers, 78XX Media Servers	CallManagerEvents	Trap: 192.168.137.46:162 Email: ccm-team <b>Device-Based</b>	Always	Active
2. CallQuality	Not Applicable	[Critical Service Quality Issue, Multiple Service Quality Issues, Servic...	Trap: 192.168.138.46:162 Email: call-team <b>Service Quality-Based</b>	Always	Active

## Notification Criteria

Notification criteria defines what you want to monitor for the purpose of sending notifications. (A notification criterion is a required part of any subscription.) The criteria that causes a notification can be defined by selecting the event sets that would cause a notification and then by selecting additional matching criteria for the event set.

Operations Manager supports two types of notification criteria (both discussed next):

- Device-based
- Service Quality- based.

The Notification Criteria is defined in Operations Manager using a Wizard-based dialog. The first step is to select the type of notification criteria, highlighted here.

# Event Notification Services

## Define Device-Based Criteria

*Limit which alerts / events are reported to user by ...*

**Add Device-Based Criterion**

Criterion Name: ExpressExceed

Customer Identification (Optional):

Customer Revision (Optional):

Alert Severity:  Critical  Warning  Informational

Alert Status:  Active  Acknowledged  Cleared

Event Set Type: CCMEExceeded

Event Severity:  Critical  Warning  Informational

Event Status:  Active  Acknowledged  Cleared

Include updates to group membership

- Step 1 of 3 -

< Back Next > Finish Cancel

Select Alarms Severity/Status

Select Event Set

Select Events Severity/Status

## Notification Criteria: Device-Based

If you selected Device-Based Criteria, the Wizard dialog will allow you to select devices to monitor. The dialog includes the following:

- Devices--The devices or device groups that you want to monitor.
- Event sets--(Optional). One or more groups of events that you want to monitor.
- Alert severity and status--One or more alert severity levels and status.
- Event severity and status--One or more event severity levels and status.

# Event Notification Services

## Define Service Quality-Based Criteria

Limit which **Service Quality** alerts are reported to user by ...

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## Notification Criteria: Service Quality-Based

If you selected Service Quality-Based Criteria, the Wizard dialog will allow you to select criteria to notify you based on the following:

- Phones, endpoints, or probes--Phones, call endpoints, or probes that you want to monitor.
- Alert severity and status--One or more alert severity levels and status.
- Event severity and status--One or more event severity levels and status.
- Note: You cannot customize the names and severity of the Service Quality-based events displayed by Notifications.
- Service Quality-based criteria are useful when the Service Monitor application and Cisco 1040 sensors are deployed in the network. Operations Manager must be configured as a trap receiver within the Service Monitor application.

### Note(s):

- Service Quality-based criteria do not include events sets.

# Event Notification Services Subscription (Tying It All Together)

**Destination: Add Device-Based Criterion**

Always Active:

Active: From 08:00 To 19:00

Include Link to Notification Details:

Subscription Type:  Trap  E-Mail  Syslog

Showing 20 records

	Hostname	Port	Comments
1.	HPOV	162	
2.			
3.			
4.			
5.			
6.			
7.			

Step 2 of 3 -

< Back Next > Finish Cancel

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## Subscription – Tying It All Together

The next step in the Wizard-based dialog is to define the subscription to the notification criteria. A subscription in Operations Manager is the final part of defining Notification Services. The subscription is a user-defined set of rules for generating and sending notifications. The subscription includes:

- Notification criterion--A named set of reasons to generate a notification.
- Notification type--The type of notification to send: SNMP trap, e-mail, and Syslog.
- Notification recipients--Hostnames and ports for system that listen for SNMP traps or Syslog messages; or e-mail addresses.
- Daily subscription activity period--The hours during which Operations Manager should use this subscription while monitoring the alerts and events for which to send notifications.

An extremely helpful feature in OM is to have each subscription configured whether or not to send URLs that enable the recipient to open Operations Manager directly to the relevant page of information. This can be enabled using the checkbox illustrated above.

The last step in the Wizard-based dialog, not shown, is a summary of your notification criteria configuration.

# Hyperlinks to Tools in Email Notification Based on Event and Device Types

From: OM-SJC [mailto:OM-SJC]  
Sent: Tuesday, November 15, 2006 10:43 AM  
To: xx  
Subject: 00000XG;172.19.103.220;Tue 15-Nov-2006 10:43:09 PST;Critical;Cleared

\*\* This message is generated from IP Communications Operations Manager \*\*

EVENT ID = 00000XG  
ALERT ID = 00000RW  
CREATION TIME = Tue 15-Nov-2006 10:43:09 PST  
STATUS = Cleared  
SEVERITY = Critical

**MANAGED OBJECT = 172.19.103.220**  
**EVENT DESCRIPTION = HighResourceUtilization**  
**CUSTOMER IDENTIFICATION = SJC-Devices**  
**CUSTOMER REVISION = SJC-Devices-Nov15**

\*\* Related Tools \*\*

**Event History =**

<http://10.20.1.5:1741/iptm/AFDFHReportAction.do?DeviceName=172.19.103.220&Component=IP%20Phone%20registered-172.19.103.220&ReportType=eventReport>

**Performance =**

<http://10.20.1.5:1741/iptm/GSUgraphAction.do?DeviceNames=172.19.103.220&Component=IP%20Phone%20registered-172.19.103.220>

**Detailed Device View =** <http://10.20.1.5:1741/iptm/ddv.do?deviceInstanceName=172.19.103.220>

**Edit Threshold =** <http://10.20.1.5:1741/iptm/ThresholdMain.do?PTMDeviceName=172.19.103.220&Source=AAD>

**Alert Details =** <http://10.20.1.5:1741/iptm/Events.do?DeviceName=172.19.103.220>

Hyperlinks to specific CUOM Event



## Hyperlinks to Tools in Email Notification

As seen in the Wizard Step 2, there is a checkbox called, **Include Link to Notification Details**. If selected, the notification will include a link back to Operations Manager for more details. This topic illustrates an example of an email notification that contains hyperlinks to more details in Operations Manager.

*<Intentionally Blank>*



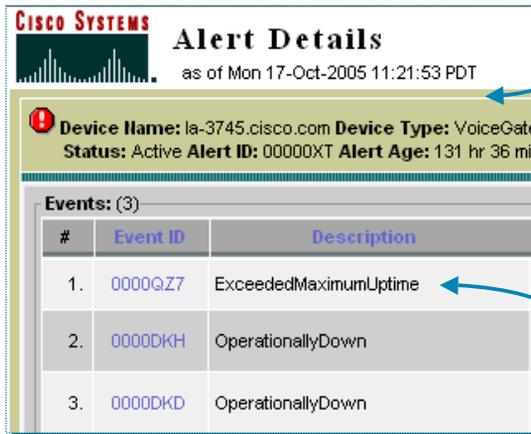
# Customization / Advanced Features

- Operational Status Views
- Diagnostic Tests
- Inventory Management
- Reports
- Event Notification
- **Customization / Advanced Features**



# Customize Event Names / Severity Levels Overview

Customizing Events - Optionally, change event descriptions that are more meaningful to you or change the severity level of an event. These customized names will be reflected in both the Alerts and Events display and any Alert History reports you generate.



Event Descriptions appear in Notifications, the Alerts and Events display, and any Alert History reports you generate.

**Customize Description**

- What does Exceeded MaximumUpTime really mean?
- Maybe change description to: Dial-on-Demand uptime >7200 seconds

## Customizing Event Names and Severity Levels

It might be helpful to make event names more descriptive for viewing in Operations Manager. This task will allow you to do this. When you customize an event description, the new description is reflected in all notifications--e-mail, SNMP traps, and syslog--and on all user interfaces.

When you customize event severity, it is reflected in all notifications--e-mail, SNMP traps, and syslog. Operations Manager uses only the event severity levels in the following table.

Severity Level	Value that Operations Manager Defines	Value That Operations Manager Writes to Notifications	
		E-Mail and SNMP Traps	Syslog Messages
Critical	0	0	2
Warning	1	1	4
Informational	2	2	6

# Customize Event Names / Severity Levels

## Notifications>Event Customization

**Event Customization**

Showing 148 records

<input type="checkbox"/>	Event Code	Default Description	User-Defined Description	User-Defined Severity
<input type="checkbox"/>	2059	ActivePortThresholdExceeded	ActivePortThresholdExceeded	0: Critical
<input checked="" type="checkbox"/>	2001	ApplicationDown	ApplicationDown	1: Warning
<input checked="" type="checkbox"/>	2002	ApplicationPartiallyRunning	ApplicationPartiallyRunning	2: Informational
<input checked="" type="checkbox"/>	2103	AvailableInboxLicenseLow	AvailableInboxLicenseLow	1: Warning
<input type="checkbox"/>	2104	AvailableLicenseLow	AvailableLicenseLow	0: Critical
<input type="checkbox"/>	4004	AverageLatency_ThresholdExceeded	AverageLatency_Thresh	
<input type="checkbox"/>	1000	BackupActivated	BackupActivated	

Restore Default Description Apply

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Features 2-89

## Customizing Event Names and Severity Levels

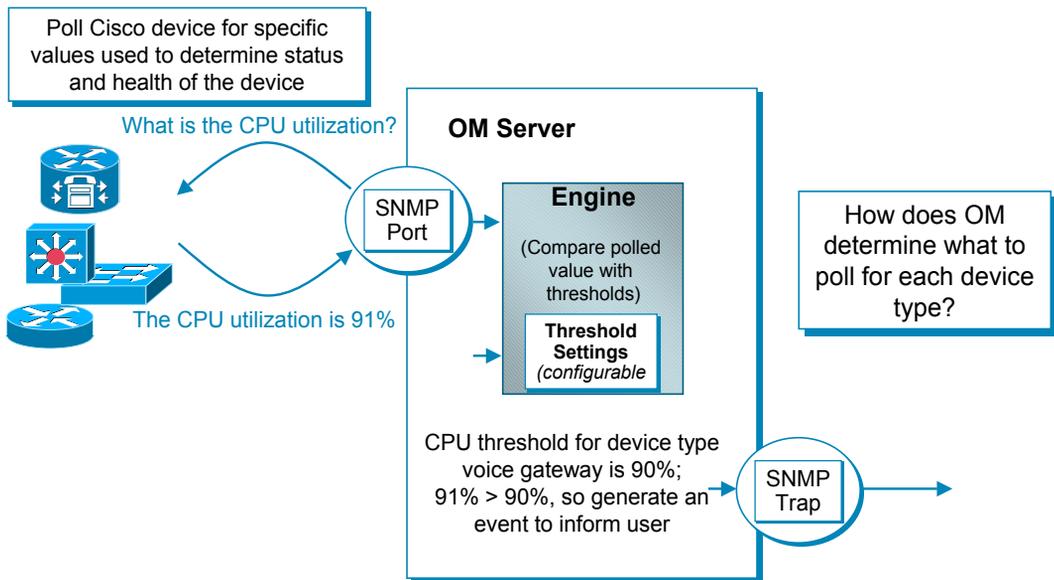
Changing the default event description or severity level of an event is easy! From the Notifications tab, click on Event Customization. Then just select the event checkbox that you wish to customize; change the description or severity level; then click Apply.

You can specify a customized event severity level between 0 and 7. When generating traps, the severity level you specify for the event is stored in the CISCO-EPM-NOTIFICATION-MIB and is sent in all notifications.

Note(s):

- When you customize event severity, Operations Manager continues to process the event based on its default severity. Also, severity levels 3 through 7 are undefined in Operations Manager.
- You can quickly and easily restore the default name and severity for any and all events.

# Polling Parameters and Thresholds Overview



## Polling Parameters and Thresholds - Overview

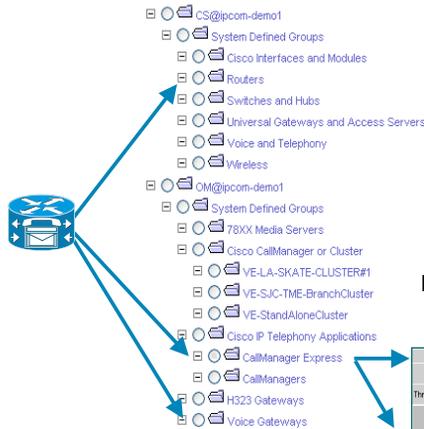
Operations Manager polls all active devices in its inventory. Operations Manager has the knowledge about each device, in particular, its device type. For each device type, specific parameters relative to that device type or group is polled from the MIB (Management Information Base) of the device. When a device is polled, Operations Manager receives the data on many parameters. This data is compared against pre-defined threshold values. If the thresholds have been exceeded, or values have fallen below acceptable levels, Operations Manager generates the appropriate events.

So, how does Operations Manager determine what parameters to poll for each device type? Let's discuss this next.

# Polling Parameters and Thresholds

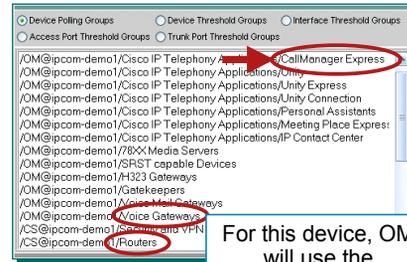
## Which Polling/Threshold Parameter to Use?

Devices become members of one or more groups



This device is a member of three different groups

Which group parameters does OM use?  
OM uses the polling and thresholds for the **overriding group** (priority based)



For this device, OM will use the CallManager Express polling because it has the highest priority of the three groups the device belongs to

Each group has specific Polling and Threshold Settings

Parameter	Current Value	New Value
Health Settings	80%	80
Voice Health Settings	90%	90
Voice Utilization Settings	10%	10
Reachability Settings	15%	15
Connector Port and Interface Settings	5%	5
Access Port Settings	90%	90
Processor and Memory Utilization Settings	240	240
Environment Settings	240	240

## Which Polling Parameters and Thresholds to Use?

So, how does Operations Manager determine what parameters to poll for each device type? When devices are put into the Operations Manager inventory, they are placed into groups based on information collected from them. These groups may be device, function, or application based. In fact, many devices become members of more than one group.

Each group has been pre-assigned both a polling group indicating what data to retrieve and how often, and a threshold group, which provides the minimum acceptable value for the retrieved data. So a device is polled based on the polling parameters assigned to the group that they belong to. So what happens when a device belongs to multiple groups; which group parameters are used? Operations Manager provides a priority hierarchy for the polling groups. The group with the highest polling group priority becomes the *Overriding Group* for the device.

In the example above, a device belongs to the router group, CallManager Express, and gateway group. Looking at the polling group priority hierarchy, we can see that the CallManager Express polling group has the highest priority; therefore, the device will be polled according to the CallManager Express polling group.

This concept also exists for device, interface, access port, and trunk port threshold groups.

# Polling Parameters and Thresholds

## Polling Parameters

The screenshot displays the Cisco Unified Operations Manager interface. The top header shows the Cisco Systems logo and the text "Cisco Unified Operations Manager Service Level View as of Fri 05-Jan-2007 12:36:01 PST". Below the header, there is a navigation pane on the left with a tree view of devices, including "All IP Communications Devices [default]", "CCM502", "SJ-TME-CLUSTER", and "Gateway and Gatekeepers". The main area shows a network map with several devices, including a WAN router (192.168.137.89) and two CCM devices (nmtg-sj-com-pri.cisco.com and nmtg-sj-com-sec.cisco.com). A context menu is open over the CCM devices, listing options such as "Alert History", "Alert Details", "Associated Phones", "Threshold parameters", "Performance", "Operations Manager Device Center", "Polling parameters", "Connectivity Details", "ER", "DR", "Phone Registration Test", "Launch CallManager Administration", and "CallManager Serviceability". The "Polling parameters" option is highlighted with a red box and a blue arrow pointing to the right, with the text "next slide" next to it. A blue box with a white arrow points to the "Polling parameters" option, containing the text "Changes polling for entire overriding group not just individual device!". Another blue box with a white arrow points to the CCM device icon, containing the text "Right mouse click on CCM". A third blue box with a white arrow points to the "Polling parameters" option, containing the text "Same concept for Thresholds".

- CCM could belong to multiple device groups; the device group that needs to be edited for this CCM is the **Overriding Group**
- By selecting the **Polling Parameters** from the Service Level View, Operations Manager will select the correct device group for editing

Alert History  
Alert Details  
Associated Phones  
Threshold parameters  
Performance  
Operations Manager Device Center  
**Polling parameters** next slide  
Connectivity Details  
ER  
DR  
Phone Registration Test  
Launch CallManager Administration  
CallManager Serviceability

Right mouse click on CCM

Changes polling for entire overriding group not just individual device!

Same concept for Thresholds

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Features 2-92

## Polling Parameters

A device is polled based on the parameters of the *overriding* polling group. So how do you figure out the overriding group in case you wish to make modifications to the polling or threshold parameters? We can easily modify the polling parameters for the overriding polling group of a device by using the following steps:

1. From the Service Level View, find the device in question (either on the map or the navigation tree) and right click on it to bring up the context-sensitive menu.
2. Select **Polling Parameters**. (See next page.)

# Polling Parameters and Thresholds

## Edit Polling Parameters

The screenshot shows two instances of the 'Polling Parameters: Edit' dialog box. The top instance shows the 'Parameter Type' dropdown menu with 'Voice Utilization Settings' selected. The bottom instance shows the 'Polling Enabled' checkbox checked for the 'Cisco CallManager and Registered MGCP Gateway Utilization' parameter.

**Multiple polling categories**

**Voice Utilization Settings must be enable to view route-list report and performance metrics**

Parameter	Interval (sec)	New Interval (sec)	Timeout (msec)	New Timeout (msec)	Retry	New Retry	Defaults	Polling Enabled
Reachability Settings:	240	240	700	700	3	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Connector Port and Interface Settings:	240	240	700	700	3	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Access Port Settings:	1200	1200	700	700	3	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Parameter	Interval (sec)	New Interval (sec)	Timeout (msec)	New Timeout (msec)	Retry	New Retry	Defaults	Polling Enabled
Cisco CallManager and Registered MGCP Gateway Utilization:	240	240	NA	NA	NA	NA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

• Click **Save** if there are more settings to change, click **Apply** to save and exit  
 • Select **Administration > Polling and Thresholds > Apply Changes** to reconfigure OM to use new settings

Buttons: Save, **Apply**, Cancel, Help

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Features 2-93

## Editing Polling Parameters

The Polling Parameters: Edit dialog for the device's overriding group is displayed. There are multiple categories of parameters selectable using the Parameter Type pull down list. Parameters can be enabled and the retrieval or polling interval can be modified.

This changes the polling parameters for all devices in this group not just the current device!

Click **Apply** to save the new settings

For the new settings to take effect, select **Administration > Polling and Threshold > Apply Changes**.

Changes to polling parameters and threshold values do not take effect until you apply changes, thereby reconfiguring Operations Manager to use the new values. Similarly, after you resume devices or device components that were suspended from polling, you must apply changes for the device elements to be polled.

**TIP:** To graph performance for CallManagers, the Voice Utilization polling parameter needs to be enabled. The Voice Utilization settings control polling for performance and capacity data and is disabled by default. Use these steps on "Editing Polling Parameters" to change the setting.

# Polling Parameters and Thresholds

## Viewing Group Members

The screenshot shows the Cisco Unified Operations Manager Administration console. The top navigation bar includes 'Administration' (1), 'Polling and Thresholds' (2), and 'Polling Parameters' (3). The main content area displays the 'Polling Parameters: Select Device Group' dialog box, which lists various device groups such as 'CS@ipcom-demo1', 'System Defined Groups', 'Cisco Interfaces and Modules', 'Routers', 'Switches and Hubs', 'Universal Gateways and Access Servers', 'Voice and Telephony', 'Wireless', 'OM@ipcom-demo1', 'System Defined Groups', and 'User Defined Groups'. A 'View' button (4) is highlighted, with an arrow pointing to 'next slide'. A callout box says 'Select a device group' and another says 'View members of the group, and their polling settings'. A third callout box at the bottom left says 'Same concept for Thresholds'.

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## Viewing Group Members

To determine the members of a group, follow this procedure. It also proves useful in determining the overriding group for any of the group members.

1. From the Operations Manager desktop select the **Administration** tab.
2. Select the **Polling and Thresholds** option.
3. From the TOC select **Polling Parameters**. The Polling Parameters Select Device Group dialog is displayed.
4. Select a group from the navigation tree and click **View**. (See next page.)

# Polling Parameters and Thresholds

## View Group Members, (Cont.)

Even though this device is a member of the **Routers** group, it is also a member of the **CallManager Express** group which is higher priority than the Router group

Administration > Polling and Thresholds > Priorities

Device Name	Parameter Type	Parameter	Polling Enabled	Default Value (sec)	Default Retries	Default Timeout (msec)	Current Value (sec)	Current Retries	Current Timeout (msec)	Overriding Group
69. la-3845-cmcue.cisco.com	Voice Health Settings	FXX Interface Settings	Enabled	240	3	700	240	3	700	/OM@ipcom-demo1/System Defined Groups/Cisco IP Telephony Applications/CallManager Express
60.		DS1 Voice Port Settings	Enabled	240	3	700	240	3	700	
61.		Application Polling Settings	Enabled	240	NA	NA	240	NA	NA	
62.		Cisco CallManager Express Settings	Enabled	240	3	700	240	3	700	
67.		Utilization	Enabled	240						
68.		H323 Gateway Utilization	Enabled	240						
68.	Data Settings	Access Port Settings	Enabled	1200						
69.		Connector Port and Interface Settings	Enabled	240						
70.		Reachability Settings	Enabled	240						
71.		Environment Settings	Enabled	240						
72.		Processor and Memory Utilization Settings	Enabled	240						

## Viewing Group Members, (Cont.)

The polling parameters and group members for the selected polling group are displayed. (The example above, the *Routers* group was selected). It lists all members of the group as well as the polling parameters in use for the devices overriding group, which is listed in the far right-hand column.

The router circled in the figure above may be a member of the Router group, but is being polled using the CallManager Express polling parameters because it is also a member of that group and it has a higher priority than the router group. This can be seen in the last column called, *Overriding Group*.

# Polling Parameters and Thresholds

## Edit Threshold Settings

Cisco Unified Operations Manager  
A product from the Cisco Unified Communications Management Suite

Monitoring Dashboard | Diagnostics | Reports | Notifications | Devices | Administration

You Are Here > Administration > Polling and Thresholds > Thresholds

TOC  
.. Polling Parameters  
.. Thresholds (3)  
.. Priorities  
.. Apply Changes

Select a device group

Thresholds: Select Device Group

CS@uom-demo1  
System Defined Groups  
OM@uom-demo1  
System Defined Groups  
78XX Media Servers  
Access Port Groups  
Cisco IP Telephony Applications  
CallManager Express  
CallManagers  
H323 Gateways  
Interface Groups  
Trunk Port Groups  
Voice Gateways

Edit (4) | Revert to Default Settings | View

next slide

Can also edit over-riding device group by right-clicking on a device from Service Level Map, and selecting Threshold Parameters

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## Edit Threshold Settings

These parameters determine when events should be generated based on the value of the attribute polled. The attributes are compared against the pre-defined acceptable threshold values.

Thresholds are also associated with device groups. To change the thresholds for a group use the following steps:

1. From the Operations Manager desktop, select the **Administration** tab.
2. Select the **Polling and Thresholds** option.
3. From the TOC select **Thresholds**. The Thresholds Select Device Group dialog is displayed.
4. Select a group to modify the thresholds for from the navigation tree and click **Edit**. (See next page.)

# Polling Parameters and Thresholds

## Edit Threshold Settings, (Cont.)

**Managing Thresholds: Edit**

Group Name: /OM@ipcom-demo1/System Defined Groups/Cisco IP Telephony Applications/CallManagers

Parameter Type: Voice Health Settings

Threshold Category: Processor and Memory Settings

Parameter	Current Value	New Value	Default
Free Physical Memory Threshold:	15 %	<input type="text" value="15"/>	<input checked="" type="checkbox"/>
Processor Utilization Threshold:	90 %	<input type="text" value="90"/>	<input checked="" type="checkbox"/>

Make changes as appropriate

Saves to database  
(To Apply changes later, select *Administration > Polling and Thresholds > Apply Changes*)

Save and Apply

Add or remove threshold parameters

## Edit Threshold Settings, (Cont.)

The Managing Thresholds: Edit dialog is displayed. There are multiple Parameter Types that can be selected using the pull down menu. And for each parameter type, there are multiple Threshold Categories. When you edit thresholds, the values that you update are associated with groups, not with individual devices, ports, or interfaces. Simply find the threshold category and then the threshold to change. Review the current value and then make your change. Click **Apply** to save your changes.

You can selectively disable threshold settings by clicking on the **Customize Settings** button. From here, Operations Manager will illustrate the variables that are currently being monitored against threshold settings and other variables that are not being monitored against threshold settings. Operations Manager allows the user with the appropriate user role to allow or discontinue monitoring against the thresholds.

Before the changes take effect, you must select the **Administration > Polling and Thresholds > Apply Changes** task.

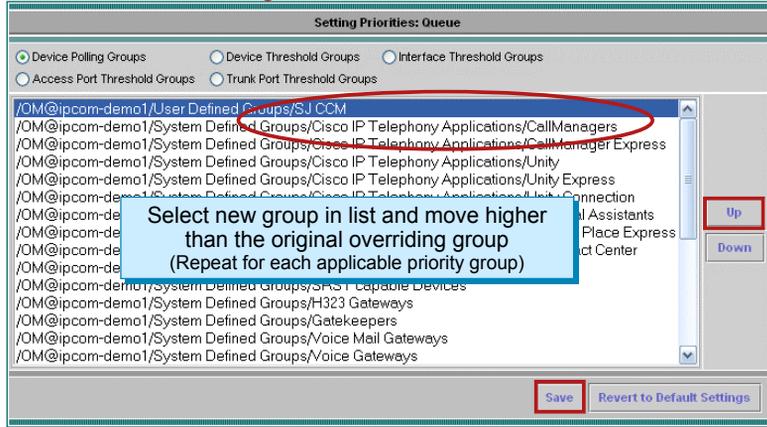
# Polling Parameters and Thresholds

## Creating New Polling/Threshold Groups

1. Create User-defined group for the CallManagers to monitor differently (*i.e. Call Managers in San Jose*)
2. Modify polling parameters for new group
3. Modify Threshold Parameters for new group
4. Make new group's priority higher than the regular CallManagers group and save changes
5. Apply changes (*Administration > Polling and Thresholds > Priorities*)

What if you want to monitor certain CallManagers differently than others?

Administration > Polling and Thresholds > Priorities



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Features 2-98

## Creating New Polling / Threshold Groups

In many cases, the existing polling and threshold values for a group are adequate. But what happens when you wish to monitor a subset of the devices in a given group differently? For example, you wish to more frequently poll and change the thresholds for only the San Jose CallManagers and still monitor the remaining CallManager with the default CallManager values. This can be achieved by simply creating a user-defined device group that contains just the San Jose CallManagers. (Creating user-defined device groups were discussed in an earlier lesson.)

1. Create a new device group
2. Use the **Administration > Polling and Thresholds > Polling Parameters** task to select the new device group and modify its polling parameters.
3. Use the **Administration > Polling and Thresholds > Thresholds** task to select the new device group and modify its threshold parameters.
4. At this point the devices will still be polled using its old group polling parameters. To use the newly modified parameters, use the **Administration > Polling and Thresholds > Priorities** task to select the user-defined group and move it up the list until it is above the old polling group entry. This will give it higher priority. **Save** changes.
5. Apply the changes to have them take effect using the **Administration > Polling and Thresholds > Apply Changes** task.

# Custom Dashboard Views Overview

- Step 1: First, create a new user-defined device group (ex: "West Side CCMs") from *Devices>Device Groups*
- Step 2: Secondly, activate the device group as a view in one or more dashboards

The top screenshot shows the Cisco Unified Operations Manager interface with the 'Device Groups' menu item highlighted in the navigation bar. A callout box indicates that Step 1 involves defining a new view (e.g., West Side CCM) and selecting the devices in the view.

The bottom screenshot shows the 'Manage Views' table, which lists the 'West Side CCM' view. The 'Topology' and 'Alerts and Events' checkboxes are checked, indicating that the view is activated. A callout box indicates that Step 2 involves activating the new view in the desired dashboards.

View Name	Topology	Alerts and Events	Service Quality Alerts	IP Phones
1. West Side CCM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

## Custom Dashboard Views - Overview

As you have seen throughout this section, views are logical groupings of devices that appear in the Monitoring Dashboard displays (Service Level View, Alerts and Events, Phone Activities, and Service Quality Alerts). There are two default views: **All Alerts** and **Suspended Devices**. These views are static and cannot be edited, deactivated, or deleted. The Service Level View display contains the **All IP Communications Devices** view, which is a default view that cannot be edited, deactivated, or deleted.

Once you decide how you want to cluster your devices into a logical set, create a new User Defined Group in the **Device> Device Groups** menu, and a new corresponding view is created.

Use the **Monitoring Dashboard> Manage Views** menu to create and activate a view of these device groups so they are shown in the Monitoring Dashboard displays. View elements are not shown until the view is activated and is displayed in the view pane (normally every two minutes).

The Monitoring Dashboard displays can have a maximum of 18 active views.

# Custom Dashboard Views

## Using New Dashboard Views

**Before**

**After**

Alerts shown for only those members of the device group (**West Side CCM**)

#	!	ID	Device Type	Device Name
1.	!	00000TP	MediaServer	ny-skate-1.cisco.com
2.	!	00000T3	MediaServer	ny-porche-1.cisco.com
3.	!	00000TA	MediaServer	ny-skate-3.cisco.com

## Custom Dashboard Views - Using New Dashboard Views

The result of creating and activating a new device view illustrated above. This creates an easy to way organize the wealth of information provided by Operations Manager!

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**CISCO**

**Thank You!**

Continue on to Chapter 3 to use the many features of Operations Manager.

Cisco Systems



# Cisco Unified Operations Manager

## Usage Scenarios

### Chapter 3



# Chapter 3 Outline

## Scenarios

1. Getting Started
2. Preparing OM for Initial Use
3. Normal Operational Status
4. Service Availability Testing
5. Node-to-Node (IP SLA) Testing
6. Experiencing Phone Outages
7. Performance Monitoring



## Chapter 3 Outline

As seen in the previous chapter, Operations Manager provides a unified view of the entire Unified Communications infrastructure and presents the current operational status of each of the elements of the Unified Communications deployment. It continuously monitors the current status of different Unified Communications elements such as Cisco® CallManager, Cisco Unity®, Cisco®, CallManager Express, Cisco Unity Express, Cisco IP Contact Center elements, gateways, routers, and phones and provides different diagnostic tools for faster trouble isolation and resolution. It monitors and evaluates the current status of both the Unified Communications infrastructure and the underlying transport infrastructure in the network.

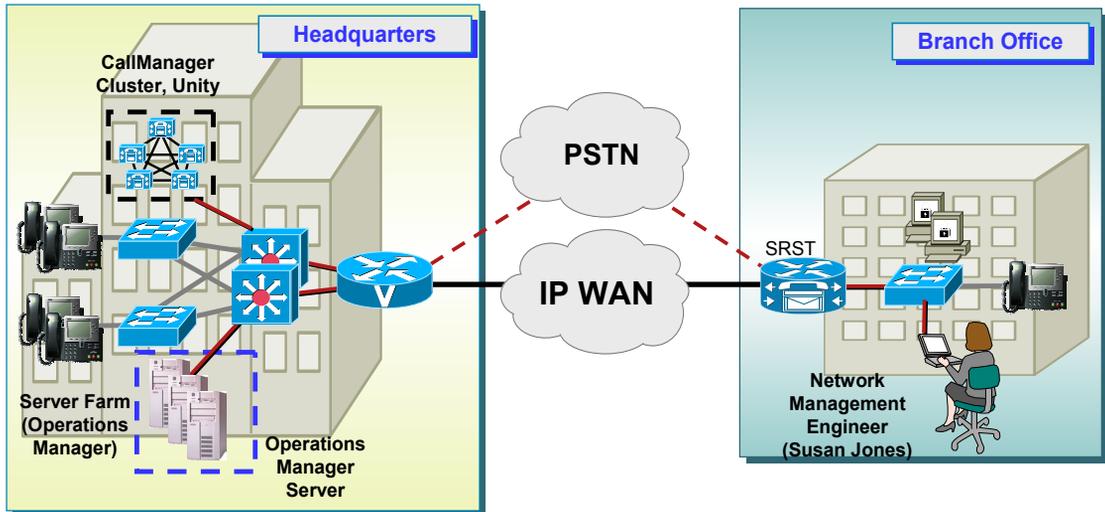
In this chapter, several scenarios will be presented detailing the steps required to configure and effectively use the different features in Operations Manager.

The first couple of scenarios go through the steps to prepare the network devices and the Operations Manager application for initial use. Thereafter, the scenarios look at common situations for using many of the features described in Chapter 2.

To enhance the effectiveness of the chapter as a learning resource, the reader is encouraged to follow along on an operational system, and to explore the other function options not covered by this tutorial. It would also be wise to view the help screens associated with all functions to better understand the many different options available for most tasks. Launch help by selecting the [Help](#) link in the upper right-hand corner of the application desktop. The help is content sensitive.

# Network Description for Scenarios

## Company ABC



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Scenarios 3-3

## Network Description – Company ABC

To help facilitate the reader's understanding of the setup and use of Operations Manager, the scenarios will follow the deployment of Operations Manager in a fictional company – Company ABC.

Company ABC has recently adopted Cisco's strategy for converging voice, video, and data onto a single network infrastructure using the Cisco AVVID (Architecture for Voice, Video and Integrated Data). Company ABC is also considering using several other CiscoWorks products such as: LAN Management Solution (LMS) and QoS Policy Manager (QPM)) to help ensure their network could both support voice and was properly configured for it.

Company ABC wishes to protect their investment by monitoring and evaluating the current status of both the Unified Communications infrastructure and the underlying transport infrastructure in the network. The lead network engineer for Company ABC, Susan Jones, has been tasked with the deployment and use of Operations Manager. So let's peek over Susan's shoulder as she goes about her assignment.

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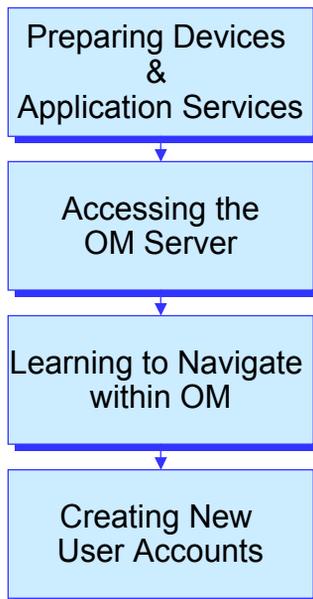
# Getting Started

- **Getting Started**
- Preparing OM for Initial Use
- Normal Operational Status
- Service Availability Testing
- Node-to-Node (IP SLA) Testing
- Experiencing Phone Outages
- Performance Monitoring



# Scenario 1: Getting Started

## Outline



## Getting Started

In this first scenario, Getting Started, we provide the basics required to begin using Operations Manager (OM)— server access, navigation, creating user accounts, as well as important steps for preparing the devices to be managed using Operations Manager.

Prior to trying to manage the devices with the Operations Manager server, the user should first ensure that the devices have been properly configured and that the network allows for network management traffic to pass from the devices to the Operations Manager server.

The user will also learn how to access the server and learn the basic layout and navigation of both the Operations Manager homepage and its desktop.

The final step in this first scenario will show how to create a local user account and assign the user to one or more roles which allow specific privileges within Operations Manager.

Note(s):

For additional details, a link to the Operations Manager Deployment Guide can be found in Chapter 5 of this tutorial.

# Getting Started

## Preparing Devices for Management

### Reachability

- Devices to be managed must be reachable from Operations Manager using ICMP, SNMP, HTTP, and WMI

### Accessibility

- Operations Manager uses various access methods (*credentials*) to obtain device attributes and status
- Credential Types:
  - SNMP v1/v2 – Configure SNMP community strings (ro, rw) on the device
  - SNMPv3 (optional) – Configure username / pwd / encryption algorithm on the device
  - HTTP/S (CCM) – HTTPS uses SSL (Secure Socket Layer)
  - WMI (Windows Management Instrumentation) Credentials



## Preparing Devices for Management

Before Operations Manager can function correctly, the network devices they interact with must be set up correctly. Operations Manager uses open interfaces such as Simple Network Management Protocol (SNMP), Hypertext Transfer Protocol (HTTP), and Windows Management Instrumentation (WMI) to remotely poll data from different devices in the network. It does not deploy any agent software on the devices being monitored and thus is non-disruptive to system operations. Operations Manager also utilizes ICMP ping and the Cisco Discovery Protocol (CDP) to discover the network devices.

Note: Ensure that your devices meet these requirements.

1. In order for devices to be managed using Operations Manager, they need to be reachable from the Operations Manager server using ICMP Ping, SNMP, and HTTP. Ensure that firewalls are not blocking these protocols from the Operations Manager server to the devices.
2. Operations Manager uses Simple Network Management Protocol (SNMP) to read and write information from and to the MIBs located on the devices. If the information is not available in the MIB, Operations Manager utilizes HTTP to obtain the information from the html code and XML. SNMP v1/v2 or SNMP v3 (AuthNoPriv mode) are supported. The following defines how to configure SNMP on the devices; these values must also match those defined in Operations Manager. (Refer to Scenario 2 for configuring Operations Manager.)

## Preparing Devices for Management, continue ...

To enable SNMP v3 on [Cisco IOS devices](#), follow these steps

- Step 1** Create a view.  
**snmp view campus 1.3.6.1 included nonvolatile**
- Step 2** Set the security model.  
**snmp access cmtest security-model v3 authentication read campus write campus nonvolatile**
- Step 3** Create a user and specify the authentication protocol to be used.  
**snmp user cmtester authentication md5 cisco123**
- Step 4** Create a group and associate the user with it.  
**snmp group cmtest user cmtester security-model v3 nonvolatile**

To enable SNMP v3 on [Catalyst OS devices](#), follow these steps:

- Step 1** Create a view.  
**set snmp view campus 1.3.6.1 included nonvolatile**
- Step 2** Set the security model.  
**set snmp access cmtest security-model v3 authentication read campus write campus nonvolatile**
- Step 3** Create a user and specify the authentication protocol to be used.  
**set snmp user cmtester authentication md5 cisco123**
- Step 4** Create a group and associate the user with it.  
**set snmp group cmtest user cmtester security-model v3 nonvolatile**

To enable SNMP v1 or v2c on [Cisco IOS devices](#), follow these steps:

- Step 1** **snmp-server community <read-community-string> ro**
- Step 2** **snmp-server community <write-community-string> rw**

To enable SNMP v1 or v2c on [Cisco Catalyst OS devices](#), follow these steps:

- Step 1** **set snmp community read-only <read-community-string>**
- Step 2** **set snmp community read-write <write-community-string>**

# Getting Started

## Preparing Devices for Management, (Cont.)

### Configuration

- SysName must be unique
- Define one interface IP address as the network management interface
- Enable CDP for discovery of neighboring devices (ICMP ping is also used for discovery of network devices; allow ICMP ping across the network)
- If desired, configure devices to send traps to Operations Manager for display in the Alerts and Events view (required for OM management of most UC application servers)



## Preparing Devices for Management, (Cont.)

1. The system name must be unique on every Cisco IOS device for network services to discover all Cisco IOS devices on the network.
  - To set the sysName variable on a Cisco IOS device, use the following global configuration command:  
**hostname** <name>
  - To set the sysName variable on a Cisco Catalyst OS device, use the following global configuration command:  
**set system name** <name>
2. For Cisco IOS and Cisco Catalyst devices, one of the interface IP addresses must be designated as the management IP address and it must be defined as a loopback IP address.

## Preparing Devices for Management, continue ...

3. The Cisco Discovery Protocol (CDP) discovers neighboring Cisco devices on the interfaces that have CDP enabled. The CDP table can then be read by Operations Manager to learn information about neighboring devices, and to send SNMP queries to those devices.

CDP is enabled on Cisco IOS devices by default; otherwise, to enable CDP capability on IOS devices use the following commands.

- To enable CDP globally: `cdp run`
- To enable CDP on specific interfaces only: `cdp enable`
- Use the `no` command to disable CDP capability on Cisco IOS devices.

CDP is enabled on Cisco Catalyst OS devices by default. To enable CDP capability on Catalyst OS devices use the following commands.

- To enable CDP globally: `set cdp enable`
- To enable CDP on specific ports only: `set cdp enable [all | mod/port]`
- To disable CDP on Catalyst OS devices: `set cdp disable`

Use the *all* parameter to enable CDP on all ports on the device, or enter a specific module and port numbers. A range of ports can also be entered. For example: `set cdp enable 2/1-10,3/5-1`

*Do not run CDP on links that you do not want discovered, such as Internet connections and end-host connection ports on access switches. To protect from CDP DoS attacks, do not enable CDP on links that are connected to non-Cisco devices.*

4. Set a domain name on a Cisco IOS or a Catalyst OS device by using the following commands:

Cisco IOS Devices : `ip domain-name <name>`

Cisco Catalyst OS Devices: `set system name <name with domain name>`

5. The event notification system in Operations Manager can report on SNMP traps received, or forward to them from another event notification/reporting system. In these examples for enabling traps, the community string "public" helps selective processing of traps on the trap-receiving side.

To enable traps in Catalyst OS devices to be sent to a particular host, such as the Operations Manager server, enter this command:

```
set snmp trap <ip address of receiving host> public
```

To enable traps in IOS devices to be sent to a particular host, such as the Operations Manager server, using SNMP v2c, enter this command:

```
snmp-server host <ip address of receiving host> traps version 2c public
```

6. Some information in the Cisco CallManager or CallManager Express (CCM/CME) is not available in a MIB and cannot be retrieved using SNMP. In this case, the information is obtained using HTTP. The information is extracted from the html code using XML. The Cisco IOS HTTP server provides authentication, but not encryption, for client connections. The Secure HTTP (HTTPS) feature provides the capability to connect to the Cisco IOS HTTPS server securely. It uses Secure Sockets Layer (SSL) and Transport Layer Security (TLS) to provide device authentication and data encryption.

Use the following command to enable http mode: `ip http server`

# Getting Started

## Preparing Devices for Management, (Cont.)

### Media Convergence Servers (MCS)

- Verify that the appropriate services are installed for HP Insight Manager and IBM UM Services

### Cisco CallManagers (CCM)

- OM uses the AVVID XML Layer (AXL) queries in addition to SNMP to manage CCM. This requires HTTP/S username/password configuration to execute these queries (Same credentials as used for CCM Administration page)
- OM relies on the cluster name of a CCM cluster to uniquely identify and manage a CCM deployment
- Release 4.1 and 4.2 allows for secure communications between OM and CCM using SSL. (enable SSL on the CCM and specifically certain virtual directories)

### Cisco CallManagers Express (CME) and SRST

- Download the latest Speedbird IOS MIBs

### Cisco Unified Contact Center and Cisco Unity

- The appropriate Remote Serviceability Kit (RSK) must be installed for CUOM to manage them properly
- WMI credentials, which are used as the Windows username and password, must be defined in the Discovery Credentials page

### Cisco Unity Express (CUE)

- Add IP address of Unity Express device to CUOM server as if it is a separate device. Cisco Unity Express (CUE) has its own SNMP agent and management IP address.
- To manage the CUE, the latest CUE version (Speedbird) must be used and SNMP RO community strings must be configured.

## Preparing Devices for Management, continue ...

As shown in the figure above, some of the Unified Communications applications and their hosts have specific requirements as well.

# Getting Started

## Preparing Network Services

### General Services

- **Domain Name Resolution**
  - Domain name resolution is used for numerous operations in Operations Manager and if the name lookup is slow or does not exist, Operations Manager will appear slow
  - Operations Manager server must be DNS resolvable
- **Network Time Protocol**
  - To be able to correlate events across multiple devices, the devices need to have the same perception of the time
- **Port Availability**
  - Many TCP and UDP ports are used to transfer network management traffic. These ports can not be blocked.

### Cisco Unified Service Monitor Additional Services (if installed)

- **DHCP Server**
  - Provides addressing and TFTP server address to Cisco 1040 Sensors
- **TFTP Server**
  - Provides Cisco 1040 Sensors image and configuration file

## Preparing Network Services

Domain name resolution helps make management much easier - humans are much more adapt at using names as opposed to addresses. Numerous functions within Operations Manager also rely on domain name resolution. To avoid potential performance issues, make sure the servers can resolve hostname lookups using either DNS or other method.

Since much of the reporting in Cisco Unified Operations Manager and Service Monitor is used to correlate events, it is important to ensure that the server and devices are time synced using the Network Time Protocol (NTP).

If using Operations Manager through a firewall, ensure that the appropriate ports are opened to transfer management information. A list of the used ports can be found in the installation guide.

Typically, Service Monitor may also be installed in your network and integrated with Operations Manager. Service Monitor also uses two other network services: DHCP and TFTP. DHCP is used to provide addressing to the Cisco 1040 sensors. The DHCP server also provides the sensors with the TFTP server address where the 1040s will retrieve their configuration and image files. The TFTP server stores and provides the Cisco 1040 sensors with their configuration and image file.

(The Service Monitor Tutorial will discuss in detail the setup of Service Monitor and the Cisco 1040 sensors.)

# Getting Started

## Operations Manager Server Access



- Microsoft Internet Explorer 6.0.28 or 6.0.37
- Adobe Macromedia Flash Player 8.0 or higher
- JavaScript and Cookies enabled required
- Disable Pop-up blockers
- Add server to list of Trusted Sites
- Check Release Notes for changes to requirements

## Server Access

Accessing the Operations Manager server is easy! Simply launch Microsoft's Internet Explorer and enter the hostname or IP address of the Operations Manager server followed by the http port being used (port 1741 is used by default during installation) as a URL address:

http://<server-name or IP address>:1741

The login to the Operations Manager server is performed as a secure transaction, using HTTPS. Follow these steps to understand the security dialogs and get to the login screen:

1. Prior to being redirected to a secure page displaying the login banner, a pop-up Security Alert is displayed informing you of a Security Alert. To simply continue, select **Yes** or continue to the next step.
2. Optional step: The Security Alert will continue to be presented at each subsequent login until the user installs the certificate by selecting **View Certificate**.  
In doing so, the Certificate dialog will be displayed; select **Install Certificate** and follow the instructions presented. When finish select **OK** in the Certificate dialog, and then **Yes** on the Security Alert window.
3. Optional step: Using the **Tools>Internet Options> Security** dialog of Internet Explorer, add the Operations Manager server as a Trusted Internet site. In doing so, the status bar on the bottom of the browser will be removed resulting in a better screen size for the OM dashboards and dialogs.

(Refer to Chapter 4 of this tutorial for complete client hardware and software requirements.)

# Getting Started Security Certificate



- Login screen is secure (HTTPS), thus a security certificate is required
- Select **View Certificate** to install security certificate and avoid this dialog in the future

## Security Certificate

Viewing and Installing the Security Certificate is optional. The Security Alert will continue to be presented at each subsequent login until the user installs the certificate by selecting *View Certificate*.

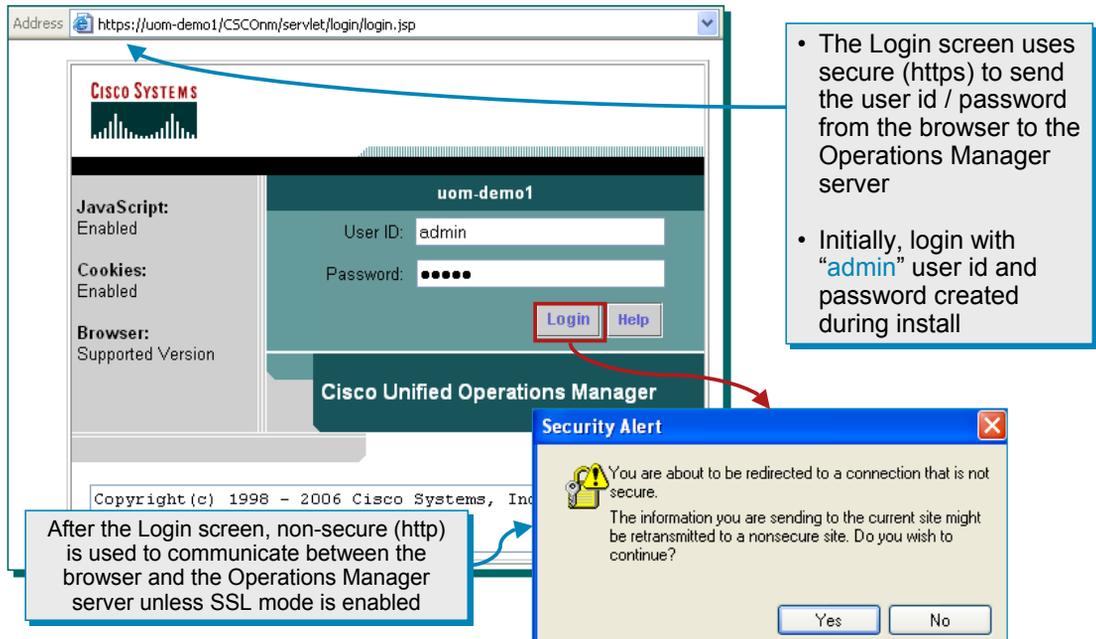
In doing so, the Certificate dialog will be displayed; select *Install Certificate* and follow the instructions presented. When finished, select *OK* in the Certificate dialog, and then *Yes* on the Security Alert window.

Note(s):

- Additional optional step: Using the *Tools>Internet Options> Security* dialog of Internet Explorer, add the Operations Manager server as a Trusted Internet site. In doing so, the status bar on the bottom of the browser will be removed, resulting in a better screen size for the Operations Manager dashboards and dialogs.

# Getting Started

## Operations Manager Server Access



The screenshot shows a web browser window with the address bar containing `https://uom-demo1/CSCOnm/servlet/login/login.jsp`. The page displays the Cisco Systems logo and a login form for 'uom-demo1'. The form includes fields for 'User ID' (containing 'admin') and 'Password' (masked with dots). There are 'Login' and 'Help' buttons. A 'Security Alert' dialog box is overlaid on the bottom right, warning that the connection is not secure and asking if the user wishes to continue. Annotations include a blue box pointing to the URL and a red box around the 'Login' button. A text box at the bottom left explains that non-secure (http) communication is used unless SSL is enabled.

- The Login screen uses secure (https) to send the user id / password from the browser to the Operations Manager server
- Initially, login with "admin" user id and password created during install

After the Login screen, non-secure (http) is used to communicate between the browser and the Operations Manager server unless SSL mode is enabled

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Scenarios 3-15

## Operations Manager Server Access

If you have installed the Operations Manager server and are logging in for the first time, you can use the reserved "admin" username and password. To log in:

1. Enter **admin** in the Name field and the password set for admin in the Password field of the Login Manager. Contact the server administrator if you do not know the password for admin.
2. Click **Login** or press **Enter**. You are now logged in. Login sessions time out after 2 hours of inactivity. If the session is not used for 2 hours, you are prompted to log in again.
3. To change the admin password or configure new users, select **Administration > Add Users > Local User Setup** from the Operations Manager menu. (This is described in more detail later in this scenario.)

# Getting Started

## Operations Manager Homepage

The screenshot shows the Cisco Operations Manager homepage. At the top left is the Cisco Systems logo. The main header reads "Unified Operations" and "A product from the Cisco Unified Communications Management Suite". Below this is a navigation bar with tabs: "Monitoring Dashboard" (selected), "Diagnostics", "Reports", "Notifications", "Devices", and "Administration". A secondary navigation bar includes "Service Level View", "Alerts and Events", "Service Quality Alerts", "IP Phone Status", "All IP Phones/Lines", and "Manage Views". The breadcrumb trail shows "You Are Here > Monitoring Dashboard". In the upper right corner, there are links for "CiscoWorks", "Logout", "Help", and "About".

Annotations on the screenshot include:

- "Home Page Tabs" pointing to the navigation bar.
- "Go to Common Services Home Page" pointing to the "CiscoWorks" link.
- "On-line help" pointing to the "Help" link.
- "The available options for the selected tab" pointing to the secondary navigation bar.
- "Monitoring Dashboards (When no devices are in the Operations Manager Inventory, dashboards are grayed out; Click Devices to Add)" pointing to the four dashboard panels.

The four dashboard panels are:

- Service Level View:** Shows a network diagram. Description: "Current status of various devices, applications, and phones, and the connectivity and relationships among them."
- Alert and Events:** Shows a telephone handset. Description: "Current alerts and events on various devices and applications supporting IP telephony services."
- Service Quality Alerts:** Shows a gauge labeled "SERVICE QUALITY". Description: "Current alerts and issues regarding service quality in the IP telephony services. To access this feature, you must first deploy and integrate Cisco Unified Service Monitor with..."
- IP Phone Status:** Shows a Cisco IP phone. Description: "List of IP phones that are experiencing outages in service."

Small text at the bottom of the screenshot includes "Operations Manager Tutorial", "© 2007 Cisco Systems, Inc. All rights reserved.", and "Scenarios 3-16".

## Operations Manager Homepage

After successful login authentication, the homepage for Operations Manager will be displayed. By default, the Monitoring Dashboard tab is selected; thus, the four dashboards can be immediately launched once the Operations Manager inventory is populated with devices. (If no devices exist in the Operations Manager inventory, all dashboards are grayed out.)

Also notice on the Operations Manager homepage, several important links in the upper right corner: CiscoWorks, Help, and About.

- The [CiscoWorks](#) link will take you to the Common Services homepage which provides links to services provided by Common Services. (A brief look at these services will be discussed shortly. However, also refer to the Common Services Tutorial for more information.)
- The [Help](#) link will open a new browser window and take you to an extensive on-line help system for Operations Manager.
- The [About](#) link will report on this software's running version.

*Note(s):*

- *The Operations Manager page is displayed as a non-secure operation (http). Optionally, access to the server can be secured using Secure HTTP (https) by enabling SSL in the Common Services. Refer to the Common Services tutorial for more information.*

# Getting Started

## Menu Navigation - Layout

The screenshot shows the Cisco Unified Operations Manager interface. At the top, there is a navigation bar with tabs: Monitoring Dashboard, Diagnostics, Reports, Notifications, **Devices**, and Administration. The 'Devices' tab is highlighted in red and labeled '1' with the text 'Select Main Task Category Tab'. Below the navigation bar, there is a sub-menu for 'Device Management' with options like Device Groups and Device Credentials. The 'Device Management' option is highlighted in red and labeled '2' with the text 'Select option'. On the left side, there is a Table of Contents (TOC) dialog box with a list of tasks. The 'Device Management' option is highlighted in red and labeled '3' with the text 'Table of Contents (TOC) displays submenu for selected option'. The main content area displays a 'Device Management: Summary' dialog box with a table showing the state of devices. The text 'Navigation bar lists the current task' points to the 'Device Management' sub-menu. The text 'Tasks listed depend on the user role(s) assigned to the user' points to the TOC dialog box. The text 'Content for selected task displayed here' points to the 'Device Management: Summary' dialog box.

**Select option** (2)

**Select Main Task Category Tab** (1)

**Navigation bar lists the current task**

**Tasks listed depend on the user role(s) assigned to the user**

**Content for selected task displayed here**  
(Note: Content may open in separate browser window)

**Table of Contents (TOC) displays submenu for selected option**  
(Note: not all options have a TOC)

**3**

**2**

**1**

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Scenarios 3-17

## Menu Navigation - Layout

Prior to using Operations Manager, it would be beneficial to become familiar the basic layout to help you understand how to navigate through its menu system.

The main features of Operations Manager are accessible by selecting the appropriate tab. The currently selected tab is identifiable by the different color of the tab and its text. These tabs are the various categories of tasks in Operations Manager:

- Monitoring Dashboards – Allows the user to launch views to monitor Unified Communications services, Unified Communications alerts and events, service quality alerts, and IP phone status
- Diagnostics – Allows the user to setup IP phone status tests, synthetic tests to test CCM services, and Node-to-Node tests to test connectivity and response time
- Reports – Allows the user to view reports on the history of alerts and events, IP phone information and changes, installed Unified Communications applications, and create personalized reports
- Notifications – Allows the user to configure what events should create user notifications and how to notify the user
- Devices – Allows the user to manage the devices that are managed by Operations Manager
- Administration – Allows the user to refine the polling and threshold settings, change application preferences, add/change user accounts, and review log files or system status

Immediately under the tabs are the tasks or additional sub-categories associated with the selected major task category. Notice that this bar is the same color as the selected tab helping to further identify which tab is selected. To select one of these options, simply click on it. The selected option will be in bold text. At this point, the selected option may have a dialog box associated with it, which will be displayed in the content area. The selected option may also have sub-tasks associated with it. These will be listed in a Table of Contents (TOC) dialog on the left-hand side of the screen. Again, to select one of the sub tasks, simply click it and its text will now become bold to identify it as the selected task.

When the selected task has no further sub-tasks, a dialog box with further instructions or simply displaying the requested information will be shown in the content display area. To determine where the user currently is, the display line (appropriately titled “You Are Here”) under the tab options indicates the path currently selected.

# Getting Started

## Basic Security - Overview

- **Authentication**
  - A procedure to verify that a login (username and password combination) for a server or device is valid
  - Cisco Unified Communication servers provide local user accounts to validate login
  - Other external methods are available
- **Authorization**
  - Access rights (allowed services) are granted to a user based on their login id and their profile
  - Examples: view only, full access, limited services



Different people have different responsibilities and thus, should have different access levels

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Scenarios 3-18

## Basic Security – Overview

By default, Operations Manager uses the Authentication and Authorization mechanism provided by Common Services.

Authentications are performed against a local user database containing a username and associated password. This information is encrypted when sent between the client and the server.

When the user account is created, one or more user roles are associated with it. These user roles, as described next, dictate what tasks in Operations Manager or Service Monitor the user has authority to execute.

When a user is authenticated, the associated user roles assigned to him are then used for authorization purposes.

# Getting Started

## Authorization – User Roles

- User roles determine the tasks that can be performed by a user
- User profile defines 1 or more user roles

System Administrator	Server configuration and user accounts
Network Administrator	Device configuration
Network Operator	Backup for most configuration management tasks
Approver	Approve jobs that change device software or configuration
Help Desk	View reports (Default User Role – assigned to all users)

- Tasks displayed on desktop change depending on user's assigned role(s)

## Authorization – User Roles

To allow for proper authorization of tasks, Operations Manager and Service Monitor employs the concept of User Roles (also known as user privileges or permissions).

Many management applications contain many critical tasks that can modify the behavior of a network, as well as, many totally benign tasks that simply display information. Obviously, it would not be good practice to allow all types of users access to the critical functions, but at the same time it would be beneficial to allow all types of users access to general public information.

Use of the various functions or tasks within Operations Manager and Service Monitor is based upon the “roles” assigned to user accounts. In fact, if a task cannot be executed by a user role assigned to the logged in user, then that task will not even be displayed in the navigation tree of the application. Common Services uses five standard User Roles to define allowable task execution. The five user roles and their basic access ability are:

- System Administrator – Can perform system administration tasks
- Network Administrator – Can perform all Service Monitor tasks
- Network Operator – Can perform all Service Monitor tasks
- Approver – Not used in Service Monitor
- Help Desk – View only

Users can be assigned more than one user role, and all are assigned the basic user role – Help Desk. The tasks allowed per user role are static and cannot be modified.

# Getting Started

## User Accounts - Permission Report

To view report: [Common Services > Server > Reports > Permission Report](#)

**Permission Report**  
as of Wed Feb 22 15:25:31 PST 2006

**IP Communications Operations Manager**

TaskName	System Administrator	Network Administrator	Network Operator	Approver	Help Desk
Add/Delete/Configure Service Monitors		X			
Add/Edit/Delete Device-Based Notification Criteria		X			
Add/Edit/Delete Event Sets		X			
Add/Edit/Delete IP Phone Collection Schedule		X			
Add/Edit/Suspend/Resume Notification Subscriptions		X			
Add/Modify/Delete LDAP Configuration					
Alias Device Details					
Analyze Phone Inventory					X
Change Event Description and Severity		X			
Change SNMP Configuration		X			
Clear Alerts and Events		X	X		
Configure Logging Levels	X	X			
Configure Polling and Thresholds		X			
Configure Service Quality Event Settings		X			

**User Roles**

- Permission Report lists all tasks for all applications installed
- Permission to perform tasks are based on user roles

**Permission per task per User Role**

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## User Accounts - Permissions Report

Common Services includes a report that displays every task for every application on the local server and which user roles have permission to execute it. To view the Permissions Report, go to the Common Services homepage and select **Common Services > Server > Reports**. From the dialog displayed, select **Permissions Report** and click **Generate**.

Note(s):

- The tasks that are executable by a user role are static and cannot be changed unless the Operations Manager server is integrated with the Cisco Secure Access Control Server (ACS) product. Refer to the Common Services Tutorial or User Guide for more information on integrating with ACS.

# Getting Started

## User Accounts

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## User Accounts

Operations Manager allows users, such as the admin user account, with the System Administration user role to create new user accounts and assign user roles to the account.

Creating a new user is simple and straight forward. The underlying Common Services provide the security administration of user accounts. To create a new user account simply follow these steps.

- From the homepage of Operations Manager, select the **Administration > Add User** task.
- The previous step / task takes you to the **Common Services > Local User Setup** task. A dialog is displayed listing all the currently defined users.
- Click **Add** to create a new user.
- Simply enter a name and password for the account and assign the user roles that user is to have. The E-mail address is optional for all user roles except for the role of Approver. (E-mail is how an application informs an Approver user of a job to approve – See the Resource Manager Essentials Tutorial or User Guide for more information about approving jobs.)

### Note(s):

- *All users can view their account using the same task, except selecting **ModifyMe** instead of **Add**. Only the password and e-mail address can be modified by the user, unless they have the System Administrator user role.*

**<Intentionally Left Blank>**

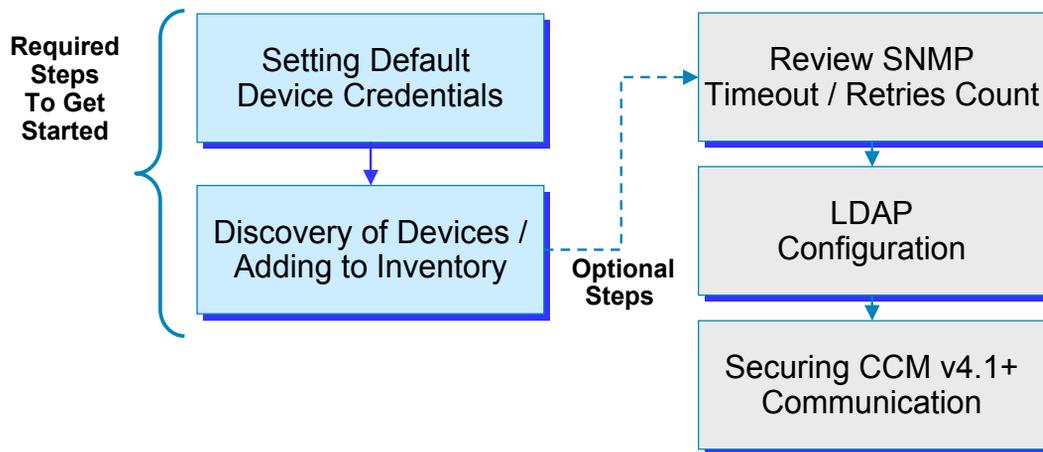


# Preparing OM for Initial Use

- Getting Started
- **Preparing OM for Initial Use**
- Normal Operational Status
- Service Availability Testing
- Node-to-Node (IP SLA) Testing
- Experiencing Phone Outages
- Performance Monitoring



## Scenario 2: Preparing OM for Initial Use Overview



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Scenarios 3-24

### Preparing OM for Initial Use

In the first scenario, the user prepared the devices to be managed, learned how to access and navigate within the Operations Manager server, and possibly created a new user account besides the default user account “admin” that was created during install.

The second scenario, *Preparing OM for Initial Use*, provides the initial configuration steps that are needed in order for Operations Manager to begin monitoring the network.

As you will see in this scenario, before Operations Manager can begin to perform management activities, the following tasks must be performed:

1. The Device and Credentials Repository (DCR) must be populated with the devices to be managed. *(For more detailed information on what the DCR is and its relationship to Operations Manager, refer to Chapter 2 of this tutorial.)*
2. Next, in order for devices to be monitored by Operations Manager, they must be added from the DCR to the Operations Manager inventory.
3. Once the devices are in the Operations Manager inventory, Operations Manager can then be configured to begin monitoring the devices, and to discover and monitor IP phones.
4. Optionally, other settings, such as: the default SNMP settings for time-outs and retries, LDAP configuration, CCM v4.1 or later security certificates, and SNMP trap receiving and forwarding can be defined.

These configuration steps above will be described and illustrated in this scenario. So let's begin!

# Preparing OM for Initial Use

## Discover Devices

The screenshot shows the Cisco Unified Operations Manager interface. The top navigation bar includes tabs for Monitoring Dashboard, Diagnostics, Reports, Notifications, Devices, and Administration. The 'Devices' tab is selected, and the 'Device Management' sub-tab is active. The left-hand TOC (Table of Contents) lists various tasks, with 'Discovery Configuration' highlighted. The main content area displays the 'Device Management: Summary' page, which includes a table showing the current monitoring state of devices managed. The table has two columns: 'State' and 'Number'. The data in the table is as follows:

State	Number
Monitored:	0
Partially Monitored:	0
Monitoring Suspended:	0
Inventory Collection in Progress:	0
Unreachable:	0
Unsupported:	0
Total Devices:	0
Total Phones:	0

Below the table, there are sections for 'Device Selection: Automatic', 'Last Discovery: Not Available', and 'Next Discovery: Not Scheduled'. A 'Configure' button is visible at the bottom right of the summary page. Annotations in the image include a box pointing to 'Discovery Configuration' in the TOC with the text 'Configure OM to discover devices' and another box pointing to the summary table with the text 'Current monitoring state of devices managed'.

## Discover Devices

Discovering devices means to automatically add devices and their credentials to the DCR and then add them to the OM inventory for management:

To configure the discovery settings, follow these steps:

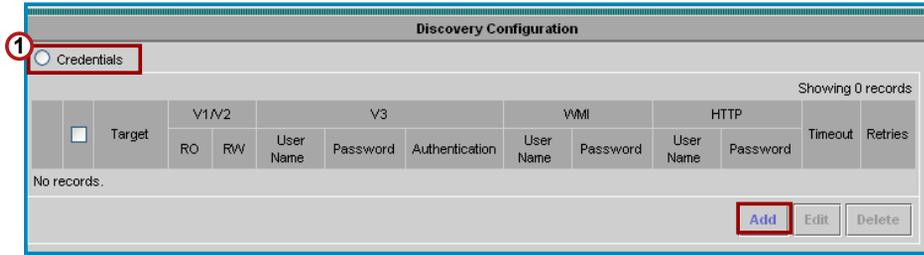
1. From the Operations Manager desktop, select the **Devices** tab and then the option, **Device Management**. The Device Management Summary dialog is displayed.
2. To enter the discovery settings, select the **Configure** button or select **Discovery Configuration** from the TOC, as illustrated above. <Continued on next page>

Other methods to add devices to the DCR include the following. These methods will be discussed later in this scenario.

- Manually – Use the Devices > Device Management > Add Devices task to manually add one or more devices to the DCR.
- Import – Use the Devices > Device Management > Import Devices task to import devices from a file (CSV or XML format) or a local NMS System (HPOV 6.x or NetView 7.x) or remote NMS system (HPOV 6.x, NetView 7.x, or ACS).

# Preparing OM for Initial Use

## Setting Discovery Credentials



- First, define discovery credentials for a single device or a group of devices
  - Credentials provide the access keys to pull device information
  - When a device is discovered, these credentials are used to pull the data from the device
  - Click **Add** one or more times to define the credentials for a single device or a group of devices
- Next, (after discovery credentials are defined), set the discovery methods and optional filters.

## Setting Discovery Credentials

Device credentials provide the access keys to pull information from the device using SNMP, HTTP, or WMI. So when a device (IP address) is discovered, these credentials are used to pull the data from the device. These discovery credentials can be defined for a single device or a group of devices.

To define the discovery credentials for a single device or a group of devices, follow these steps:

1. From the Discovery Configuration dialog, check the radio button **Credentials**.
2. To add a new device credential definition or change one that is already defined for a single device or group of devices, click **Add**. The Configure Credentials dialog appears and is discussed next.

# Preparing OM for Initial Use

## Setting Discovery Credentials, continue ...

- Define discovery credentials by defining the target: single device, multiple devices (separated by commas), subnets, or use wildcards and ranges
- Define SNMP timeout and retry for the target device(s)
- Define credentials for the target device(s)
  - SNMP v1/v2c (RO only needed for IOS devices)
  - SNMP v3
  - HTTP (only required to pull data from CCMs - data that can not be obtained using SNMP)
  - WMI (optional)- Windows credentials - MCS-based application servers only

**Configure Credentials**

**Target devices**  
Wildcard entry for devices: \*.\*.\*  
Example: \*.\*.\* or 10.76.93 [39-43]

**SNMP**  
SNMP Timeout: 3000 ms Retry: 2

**SNMPv2c/SNMPv1**  
Read Community String: ..... Verify: .....  
Write Community String: ..... Verify: .....

**SNMPv3**  
Username: .....  
Password: ..... Verify: .....  
Auth Algorithm: None

**HTTP Credentials**  
These credentials are optional and needed only for Cisco Unified Call Manager.  
HTTP Username: administrator  
HTTP Password: ..... Verify: .....

**WMI Credentials**  
These credentials are optional and needed only for MCS based application servers.  
WMI Username: ..... For eg. Domain name\User name or User name  
WMI Password: ..... Verify: .....

OK Cancel

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Scenarios 3-27

## Setting Discovery Credentials, (Cont.)

Each device in the network can have different access credentials. The Configure Credentials dialog allows the administrator to enter the SNMP v1/v2, SNMP v3, HTTP, and WMI access credentials for a single device or group of devices defined by the Target device field.

To define access credentials for an individual device, enter the specific IP address in the Target device field. Then fill in the SNMP, HTTP, and WMI credentials, and click OK.

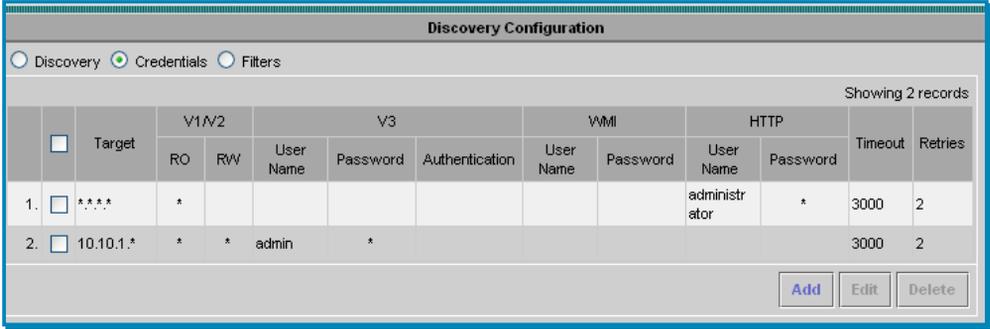
To define access credentials for a group of devices or subnet, enter the IP address range or list of IP addresses in the Target device field. Then fill in the SNMP, HTTP, and WMI credentials, and click OK. Additionally, use \*.\*.\* wildcard as a “catch-all for other devices.

Note(s):

- Operations Manager uses SNMP to poll a device’s MIB to retrieve its attributes and configuration. For IOS devices, only the SNMP read-only (RO) string is needed.
- Operations Manager also uses HTTP to pull information that is not available from a MIB. Some data from the Cisco CallManagers must be retrieved using HTTP. If the HTTP credentials are not specified, the monitoring status for the Cisco CallManagers will be “Partially Monitored”.
- To collect performance data for Cisco Unity Connection, Cisco Unity, or Cisco IP Contact Center, the Windows Management Instrumentation (WMI) credential is required. When adding these devices to Operations Manager, verify that the WMI username and password are provided.
- For security reasons, once these default credentials are entered and saved they will no longer be viewable from this page. New credential can always be added.

# Preparing OM for Initial Use

## Discovery Credentials Summary



The screenshot shows the 'Discovery Configuration' dialog box with the 'Credentials' tab selected. It displays a table with 2 records. The table columns are: Target, V1/V2 (RO, RW), V3 (User Name, Password, Authentication), WMI (User Name, Password), HTTP (User Name, Password), Timeout, and Retries. The first record has a target of \*.\*.\*.\* and a timeout of 3000. The second record has a target of 10.10.1.\* and a timeout of 3000.

Discovery Configuration												
<input type="radio"/> Discovery <input checked="" type="radio"/> Credentials <input type="radio"/> Filters												
Showing 2 records												
	Target	V1/V2		V3			WMI		HTTP		Timeout	Retries
		RO	RW	User Name	Password	Authentication	User Name	Password	User Name	Password		
1.	<input type="checkbox"/> *.*.*.*	*							administr ator	*	3000	2
2.	<input type="checkbox"/> 10.10.1.*	*	*	admin	*						3000	2

Buttons: Add, Edit, Delete

- Table lists discovery credentials defined:
  - \*.\*.\*.\* is a catch all target
  - More specific target credentials are used, if available
  - Order of target list doesn't matter
- Next, set the discovery methods and filters.

## Discovery Credentials Summary

After adding the access credentials for individual or groups of devices, the target devices are listed in the Discovery Configuration dialog, as illustrated above.

Once the discovery credentials are defined, then set the discovery methods and optional filters. These topics are discussed next.

# Preparing OM for Initial Use

## Discovery Method Selection

**Discovery Configuration**

Discovery  Credentials  Filters

**Discovery**

Use CallManager or Cisco Discovery Protocol (CDP)

Seed Device: 10.10.1.100, 10.10.2.100  
(Comma separated IP addresses. Example: 10.20.30.23, 10.12.20.33)

Use devices currently in the system

Hops: 3

Use ping sweep

Network: 10.20.1.1/24  
(Example: 172.20.57.1/24, 10.16.34.192/28)

**Run**

now

daily at 17 : 00 on  Mon  Tue  Wed  Thu  Fri  Sat  Sun

every 2 weeks at 00 : 00 on Monday

Periodically, schedule discovery to catch new or changed devices

**Discovery Methods**

- Use CCMs as seed devices to discover:
  - Other CCMs
  - Cisco Unity
  - MGCP Voice Gateways
  - H.323 Voice Gateways
  - Gatekeepers
  - CTI applications configured with CTI ports on discovered CCM
- For each seed device specified, Operations Manager attempts to locate its neighbors (up to x hops away) using CDP, ARP, and Route table discoveries
- Use ping sweeps to discover a network or end stations

## Discovery Method Selection

After credentials have been defined for one or more target devices, additional radio buttons appear in the Discovery Configuration dialog window. One of the new buttons is **Discovery**, which allows the administrator to configure how OM should discover the devices in the network. This topic describes how to set the discovery method.

The first method of populating the DCR is to allow the devices to be auto-discovered. Operations Manager can automatically discover devices and add them to the DCR through the use of seed devices or by using a ping sweep across a subnet. The seed device can be a CallManager or a device with CDP (Cisco Discovery Protocol) enabled. You can use one or both methods for discovering the devices. To define the discovery method, follow these steps.

1. The Discovery Settings dialog is displayed. Enter one or more seed devices. Seed devices are starting points for the discovery.

If the seed device is a CallManager, the process will discover other CallManagers, Unity, voice gateways, gatekeepers, and CTI applications.

For each seed device specified, OM attempts to locate other devices by querying their CDP neighbor tables. Auto-discovery requires CDP to be enabled on devices in order for one discovered device to be aware of its neighbors.

2. Optionally, select the **Use Ping Sweep** check box and specify a comma-separated list of IP address ranges using the /netmask specification. For example, 172.20.57.1/24 to specify a ping sweep range starting from 172.20.57.1 and ending at 172.20.57.255.
3. **Run** – (Required) Select a radio button and enter the desired schedule to run the discovery process.
4. Click **OK** to start discovery based on schedule specified.

# Preparing OM for Initial Use

## Filter / Limit Discovery of Devices (Optional)

**Discovery Configuration**

Discovery  Credentials  **Filters** <sup>3</sup>

IP Address: Include:   
Exclude: 10.10.1.[50-100]  
(Comma-separated IP addresses with wildcards. Example: 172.20.57.\*,172.20.119.[1-100])

DNS Domain: Include:   
Exclude:   
(Comma-separated domain names with wildcards. Example: \*.cisco.com)

SysLocation: Include:   
Exclude:   
(Comma-separated syslocation strings with wildcards. Example: San\*)

**Discovery Control Point**

- Specify which discovered devices should be included or excluded from the DCR based on IP address, DNS domain, or SysLocation

**Tip:** Use to exclude IP Phone subnets. No need to use ping and CDP to discover IP phones.

Apply

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Scenarios 3-30

## Filter / Limit Discovery of Devices (Optional)

Another radio button in the Discovery Configuration dialog window is called Filters. Filters allow the administrator to specify which discovered devices should be included or excluded from the DCR. This topic describes how to define the filters.

You may not want all devices that are discovered added to the DCR. Use the IP Address, DNS Domain, and SysLocation fields to include or exclude devices from the discovery process as noted below:

- **IP Address** - (Optional) Enter comma-separated IP addresses or IP address ranges for devices that you want to include or exclude in the auto-discovery process. You can use wildcards when specifying the IP address range. An asterisk (\*) denotes the octet range of 1-255. Also, the octet range can be constrained using the [xxx-yyy] notation.

For example: To include all devices in the 172.20.57/24 subnet in the auto-discovery process, enter an include filter of 172.20.57.\*. To exclude devices in the IP address range of 172.20.57.224 - 172.20.57.255 from the auto-discovery process, enter an exclude filter of 172.20.57.[224-255]. Both types of wildcards can be used in the same range specification; for example, 172.20.[55-57].\*

If both include and exclude filters are specified, the exclude filter is applied first before the include filter. Once a filter is applied to an auto-discovered device, no other filter criterion will be applied to the device. If a device has multiple IP addresses, the device will be processed for auto-discovery as long as it has one IP address that satisfies the include filter.

- **DNS Domain** - (Optional) Enter comma-separated DNS domain names for devices that you want to include or exclude in the auto-discovery process. The DNS names can be specified using wildcards. An asterisk (\*) matches any combination of mixed uppercase and lowercase alphanumeric characters, along with the hyphen (-) and underscore (\_) characters, of an arbitrary length. A question mark (?) matches a single uppercase or lowercase alphanumeric character or a hyphen or an underscore character. For example: \*.cisco.com matches any DNS name ending with .cisco.com. \*.?abc.com matches any DNS name ending with .abc.com, or .babc.com, etc.
- **SysLocation** - (Optional) Enter comma-separated strings that will match the string value stored in the sysLocation OID in MIB-II, for devices that you want to include or exclude in the auto-discovery process. The location strings can be specified using wildcards. For example, a SysLocation filter of San \* will match all SysLocation strings starting with San Francisco, San Jose, etc.

# Preparing OM for Initial Use

## Device Management Summary

Summary of the devices that have been included in the OM inventory for management

Click to refresh results

See next slide

Not all information can be retrieved from the device

Discovery Status is also available from the **Administration > System Status** menu

State	Number of Devices
Monitored:	41
Partially Monitored:	6
Monitoring Suspended:	0
Inventory Collection in Progress:	0
Unreachable:	11
Unsupported:	7
<b>Total Devices:</b>	<b>65</b>
<b>Total Phones:</b>	<b>19</b>

**Device Selection:** Automatic

**Last Discovery:** Completed at Thu 04-Jan-2007 17:12:24 PST.  
1 devices discovered ([View Report](#)) **Discovery Completed** [Configure](#)

**Next Discovery:** Scheduled to run on Fri 05-Jan-2007 17:00:00 PST

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## Device Management Summary

The following are the possible device states:

- **Monitored** - The device has been successfully imported, and is fully managed by Operations Manager.
- **Partially Monitored** - The device has been successfully imported by some of the backend processes in Operations Manager, but not all. Some of the information on the device can be not gathered due to its configuration or software version.
- **Monitoring Suspended** - Monitoring of the device is suspended.
- **Inventory Collection in Progress** - This is a transient state; devices will never remain in this state. Operations Manager is probing the device. This is the beginning state, when the device is first added; a device is also in this state during periodic inventory collection. Some of the data collectors may still be gathering device information.
- **Unreachable** - Operations Manager cannot manage the device. See the online help for possible reasons.
- **Unsupported** - The device is not supported by Operations Manager.

# Preparing OM for Initial Use

## Device Report

**Cisco Unified Operations Manager**  
 Devices as of Fri 05-Jan-2007 08:09:20 PST; State: Monitored

Showing 1 - 20 of 41 records

Click column heading to sort report by that column (ascending or descending)

	Device Type	Device Name	IP Address	Device Capabilities	Status	Monitored Since	Inventory Collection
1.	<input type="checkbox"/> Switch	tsbu-sw5.cisco.com	172.28.176.9	Phone Access Switch; IPSLA; Switch; Switches and Hubs	Monitored	Sat 16-Dec-2006 16:30:01 PST	Fri 05-Jan-2007 02:01:09 PST
2.	<input type="checkbox"/> Router	nmtg-demo-1712.cisco.com	192.168.159.242	Router; Routers	Monitored	Sun 17-Dec-2006 23:11:47 PST	Fri 05-Jan-2007 02:01:20 PST
3.	<input type="checkbox"/> Switch	nmtg-demo-3750pe.cisco.com	192.168.159.237	Phone Access Switch; IPSLA; Switch; Switches and Hubs	Monitored	Sun 17-Dec-2006 23:11:48 PST	Fri 05-Jan-2007 02:01:00 PST
4.	<input type="checkbox"/> Probe	nmtg-remote-2811-nm.cisco.com	192.168.137.90	Probe; Interfaces and Modules	Monitored	Sun 17-Dec-2006 23:11:48 PST	Fri 05-Jan-2007 02:01:18 PST

Select an item then take an action -->

Suspend device(s) to stop monitoring by OM

**Cisco Unified Operations Manager**  
 Fri 05-Jan-2007 08:14:36 PST; State: Partially Monitored

Select device name to obtain detailed device info

Not all information can be retrieved from the device

	Device Type	Device Name	IP Address	Device Capabilities	Status	Monitored Since	Last Inventory Collection
1.	<input type="checkbox"/> Host	nmtg-hq-pub.cisco.com	192.168.140.2	Media Server; VoiceServices; CiscoCallManager; Host; Voice and Telephony	Partially Monitored	Sun 17-Dec-2006 23:11:52 PST	Fri 05-Jan-2007 02:01:15 PST
2.	<input type="checkbox"/> VoiceServices; Unsupported; Voice and Telephony	nmtg-sj-com-sec.cisco.com	192.168.137.4	Media Server; CiscoCallManager; VoiceServices; Unsupported; Voice and Telephony	Partially Monitored	Mon 18-Dec-2006 00:23:17 PST	Fri 05-Jan-2007 02:01:17 PST
3.	<input type="checkbox"/> Host	nmtg-sj-com-pri.cisco.com	192.168.137.3	Media Server; CiscoCallManager; VoiceServices; Host; Voice and Telephony	Partially Monitored	Sun 17-Dec-2006 23:11:53 PST	Fri 05-Jan-2007 02:01:15 PST

## Device Report

Selecting the device count for one of the states in the Device Management Summary page (previous slide) provides a device report for the devices in the inventory that are in that state. These reports can be exported to a file or printed.

The Device Name can be selected to launch a Detailed Device View report that can report on all aspects of the device, including OS version, RAM, applications loaded, interfaces, environmental measurements, and more.

When a device is in the state of **“Partially Monitored”**, there are some backend data collection processes in Operations Manager that cannot retrieve all its. This typically happens because the data cannot be collected via SNMP and must be collected using HTTP, and the HTTP user name and password credentials have not been associated with the device (either in the DCR or discovery credentials).

# Preparing OM for Initial Use

## Manually Add Devices

**Manually add a single device and its credentials to the DCR**

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Scenarios 3-33

## Manually Add Devices

Automatic discovery is one way to add devices to the OM Inventory. Another way is to manually add devices.

To manually add a single device at a time to the DCR, use the **Devices > Device Management > Add Devices** task. This requires entering its IP address or host name and credentials using the wizard, illustrated above.

# Preparing OM for Initial Use

## Import Devices

**Bulk Add Devices (Import)**

Import device lists, device properties or attributes and device credentials to the DCR

- File – csv or xml format
- Local NMS
  - HPOV 6.x
  - NetView 7.x
- Remote NMS
  - HPOV 6.x
  - NetView 7.x
  - ACS
- Schedule import once, daily, weekly, monthly
- Format – see On-line help

## Import Devices

Another way to add devices is to import devices into the DCR and then into the OM inventory.

To bulk import devices from a file (CSV or XML format) or a local NMS System (HPOV 6.x or NetView 7.x) or remote NMS system (HPOV 6.x, NetView 7.x, or ACS), use the Devices > Device Management > Import Devices task. The import can be scheduled to occur at a specific time.

# Preparing OM for Initial Use

## Export Devices

**Export Device Information**

Export device lists, device properties or attributes and device credentials from the DCR

- Select which devices to export either from the DCR device selector or from a list of devices in a file
- File – csv or xml format
- Schedule import once, daily, weekly, monthly

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Scenarios 3-35

## Export Devices

The Export feature is used to export a certain list of devices and their credentials into a file. The device list can be obtained from the device selector, or from a CSV file, as described below.

- **Select from Device Selector**—Select this option if you want to export devices from the Device and Credential Repository or the OM Inventory. You can output to a file you specify in the Output File Information field.
- **Get Device List from File**—Select this option if you want to export devices that are listed in a CSV file. The file must already be present on the server. Use this option when the CSV file contains only partial device credentials and you want to get the full list of credentials from the DCR. The input CSV file checks for data with DCR, and exports the data to the output file.

To see the list of attributes that can be exported use the **dcrcli** command line tool. (Refer to the online help for more information.)

# Preparing OM for Initial Use

## Modify / Delete Devices

**Edit DCR Information**

- Use the Device Selector to locate one or more devices to modify its credentials or delete it from the DCR
- Devices can also be suspended from management and then resumed

The screenshot shows the Cisco Unified Operations Manager interface. The top navigation bar includes 'Monitoring Dashboard', 'Diagnostics', 'Reports', 'Notifications', 'Devices', and 'Administration'. The 'Devices' menu is expanded, showing 'Device Management', 'Device Groups', and 'Device Credentials'. The 'Modify/Delete Device(s)' page is active, displaying a 'Device Selector' tree on the left and a 'Device Information' panel on the right. The 'Device Selector' tree shows a hierarchy of device groups, with 'All Unreachable Devices' selected. The 'Device Information' panel shows details for the selected group, including 'Name', 'Summary', 'Group Name', 'Device Count', and 'Description'. A 'Refresh' button is located at the bottom right of the 'Device Information' panel. At the bottom of the page, there are buttons for 'View', 'Edit', 'Rediscover', 'Suspend', 'Resume', and 'Delete'.

## Modify / Delete Devices

You can modify or delete devices from the DCR or from the OM inventory. Use the Modify / Delete task to perform inventory collection, view device credentials details, suspend and resume device monitoring, edit credentials, and delete devices. To use this feature, simply select the devices that you wish to modify or delete from the Device Selector and then click the action from one of the buttons.

# Preparing OM for Initial Use

## Optional: SNMP Timeout / Retry Configuration

The screenshot displays the Cisco Operations Manager web interface. At the top, the Cisco Systems logo is on the left, and 'CiscoWorks | Logout | Help | About' is on the right. The main title is 'IP Communications Operations Manager'. Below this is a navigation bar with tabs for 'Monitoring Dashboard', 'Diagnostics', 'Reports', 'Notifications', 'Devices', and 'Administration'. The 'Devices' tab is selected and highlighted with a red box and a circled '1'. Underneath, a sub-menu shows 'Device Management' selected and highlighted with a red box and a circled '2'. The breadcrumb trail reads 'You Are Here > Devices > Device Management'. On the left side, there is a 'TOC' (Table of Contents) menu with several items, including 'SNMP Configuration' which is highlighted with a red box and a circled '3'. The main content area is titled 'SNMP Configuration' and contains the instruction: 'Specify the global SNMP settings for all devices during discovery.' Below this are two input fields: 'SNMP Timeout: 04 seconds' and 'Number of Retries: 03'. An 'Apply' button is located at the bottom right of the configuration area. A callout box at the bottom of the screenshot contains the text: 'Consider increasing the SNMP Timeout and the number of retries if the device is **unreachable** using Operations Manager, possibly due to poor response times'. At the bottom of the page, there is a footer with 'Operations Manager Tutorial', '© 2007 Cisco Systems, Inc. All rights reserved.', and 'Scenarios 3-37'.

## SNMP Timeout / Retry Configuration

If an SNMP query does not respond in time, Operations Manager will time out. It will then retry contacting the device for as many times as listed under the `snmpretries` attribute in the configuration file. The timeout period is doubled for every subsequent retry. For example, if the timeout value is 4 seconds and the retries value is 3, Operations Manager waits for 4 seconds before the first retry, 8 seconds before the second retry, and 16 seconds before the third retry. The SNMP timeout and retries are global settings and their default values are:

Timeout—4 seconds

Retries—3

To change these default setting, follow these steps:

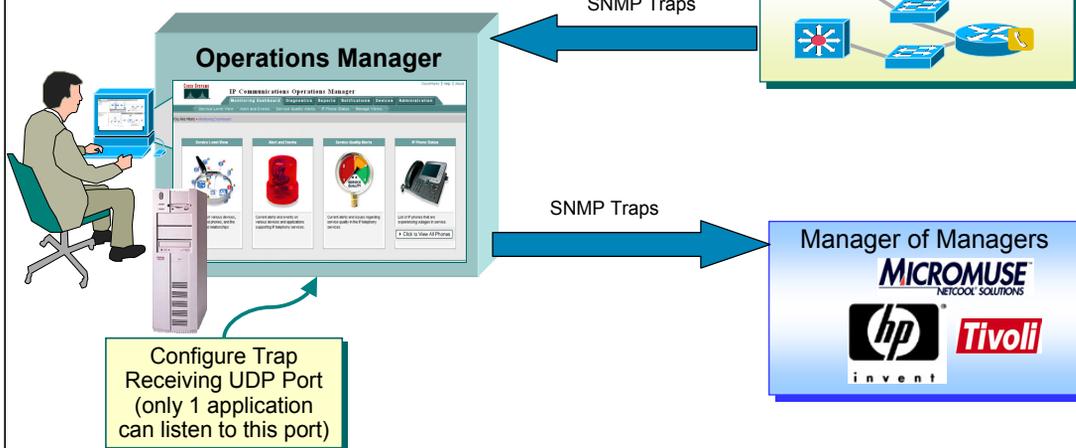
1. Select **Devices > Device Management > SNMP Configuration**. The SNMP Configuration page appears.
2. Select a new SNMP timeout setting.
3. Select a new Number of Retries setting.
4. Click **Apply** to make changes effective.

# Preparing OM for Initial Use

## Optional: Configuring SNMP Trap Receiving / Forwarding

Unified Communications devices send their traps to OM; OM can also be configured to forward them to another NMS for viewing

The source device was configured to send the SNMP traps to OM (refer to earlier step: Device Preparation)



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Scenarios 3-38

## Configuring SNMP Trap Receiving and Forwarding

Network devices can be configured to send SNMP traps to alert operators of specific conditions. For example, in an upcoming scenario, the network administrator will configure the IP SLA feature in IOS devices which can be used for performance and availability testing. When these tests exceed specified thresholds, the IP SLA device can send an SNMP trap to a trap receiver, such as Operations Manager. (SNMP traps are configured in Scenario "Getting Started".)

In order for Operations Manager to *receive* SNMP traps from various sources, such as IP SLA devices, you must perform the following:

1. Enable SNMP on your devices and configure SNMP to send its traps directly to Operations Manager. (The source device was configured earlier in this scenario using the command line interface steps for enabling SNMP and sending SNMP traps to a particular host.)
2. Operations Manager can also be used to forward the SNMP traps it receives to a list of servers and ports for event correlation or a network-wide event notification system. This capability enables Operations Manager to easily work with other trap processing applications.
3. And finally, if another application on the Operations Manager server is already listening for traps on the standard UDP trap port (162), you must configure Operations Manager to use another port, such as port 9000. Only one application per server can listen to a used port.

Step 2 and 3 above are configured in Operations Manager under **Administration > Preferences**. Let's look at this dialog next.

# Preparing OM for Initial Use

## Optional: Configuring SNMP Trap, continue ...

**System Preferences**

**Trap Forwarding Parameters**

Trap Server 1:	192.168.152.100	Port:	162
Trap Server 2:	Not configured	Port:	
Trap Server 3:	Not configured	Port:	

**CiscoWorks Servers**

RME Protocol:	http	Server:	Not configured	Port:	1741
Campus Protocol:	http	Server:	Not configured	Port:	1741
CiscoView Protocol:	http	Server:	Not configured	Port:	1741

**Other Preferences**

SNMP Trap Community:	private
Trap Receiving Port:	162
SMTP Server:	localhost
Daily Purging Schedule:	00 : 00

Apply

- In this scenario, the IP SLA source device has been configured with SNMP and will forward its SNMP traps to OM when a threshold is exceeded
- OM will then forward them to their remote enterprise NMS using the destination UDP port 162
- OM will receive the SNMP traps from the devices on UDP port 162 using the community string "private". Note that if another application on the OM server is using UDP port 162, the port number must be changed here

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Scenarios 3-39

## Configuring SNMP Trap Receiving and Forwarding, continue ...

In order for Operations Manager to *forward* SNMP traps to another remote NMS, follow these steps:

1. From the Operations Manager menu, select to **Administration > Preferences**.
2. Under the heading "**Trap Forwarding Parameters**", enter the remote NMS IP address in the Trap Server field. Enter the UDP port number that the NMS is listening to in order to receive the traps. In this scenario, the NMS is listening to UDP port 162 which is typically the default port for SNMP trap listeners.
3. The devices have been configured to sent SNMP traps to Operations Manager using a SNMP community string and UDP port number. Enter these values under the "**Other Preferences**" fields. Note that if another application on the Operations Manager server is using UDP port 162, the port number must be changed here; otherwise there will be a conflict of ports. Only one application can listen to the UDP port at a time.

# Preparing OM for Initial Use

## Optional: LDAP Configuration

The screenshot shows the Cisco Operations Manager web interface. At the top, there is a navigation bar with 'Monitoring Dashboard', 'Diagnostics', 'Reports', 'Notifications', 'Devices', and 'Administration'. The 'Devices' menu is expanded, showing 'Device Management', 'Device Groups', and 'Device Credentials'. The 'Device Management' menu is further expanded to show 'Inventory Collection', 'Device', 'IP Phone', 'SNMP Configuration', 'LDAP Configuration', 'View/Rediscover/Delete', 'Manage CCM Security Certificates', 'IP Address Report', and 'Discovery Credentials'. The 'LDAP Configuration' link is highlighted with a red box and a callout box. The callout box contains the text: 'Provides user name information for the IP Phone report if a LDAP server is deployed'. The main content area shows the 'LDAP Server Configuration' page with a table of LDAP servers (currently empty) and an 'Add LDAP Server' form. The form has sections for 'Connection Details' and 'LDAP Search Parameters'. The 'Add' button is highlighted with a red box and an arrow pointing to it.

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## LDAP Configuration

LDAP, Lightweight Directory Access Protocol, is an Internet protocol that applications use to look up information from a server. For example, every email program has a personal address book, but how do you look up an address for someone who's never sent you email? How can an organization keep one centralized up-to-date phone book that everybody has access to? That question led software companies such as Microsoft, IBM, Lotus, and Netscape to support a standard called LDAP.

"LDAP-aware" client programs, like Operations Manager, can ask LDAP servers to look up entries in a wide variety of ways. LDAP continues to be a popular standard for communicating record-based, directory-like data between programs.

If LDAP is used in the network, it can be defined here so that information on end-points in the network (i.e. phones) can be correlated. Follow these steps for defining a LDAP server for Operations Manager to use.

1. Select **Devices > Device Management > LDAP Configuration**. The LDAP Server Configuration page appears.
2. Click **Add**. The Add LDAP Server page opens.
3. In the Connections Details area, enter the following:
  - The LDAP server name or IP address
  - The port number
  - If you want to use anonymous login for authentication, select the Use Anonymous Login check box
  - An admin DN
  - Enter the password for the LDAP server and reconfirm the password
  - Enter a search base
4. In the LDAP Search Parameters are, enter a name for the search, a telephone number, and a filter.
5. Click **Add**.



# Normal Operational Status

- Getting Started
- Preparing OM for Initial Use
- **Normal Operational Status**
- Service Availability Testing
- Node-to-Node (IP SLA) Testing
- Experiencing Phone Outages
- Performance Monitoring



## Scenario 3: Normal Operational Status Outline

Checking Status of Unified Communication Services



Checking for Unified Communication Device Alerts



Checking for IP Phone Alerts / Outages



### Normal Operational Status

In this scenario, we will look over the shoulder of Susan Jones, the lead network engineer at Company ABC, as she looks at the various dashboards, features, and reports within Operations Manager. These dashboards will be reviewed by Susan or someone else on the team on a day-to-day basis. These dashboards are designed so that it can be setup and left running, providing an ongoing monitoring tool that signals the operator when something needs attention.

# Normal Operational Status

## Viewing Unified Communications Services

The screenshot displays the Cisco Unified Operations Manager Service Level View. On the left, a tree hierarchy shows the following structure:

- All IP Communications Devices [default]
  - AustinCCM40Cluster
    - AustinCluster
    - HQCluster
    - HQCCM41Cluster1
  - All Devices

The main graphical view shows four CCM clusters: AustinCCM40Cluster, AustinCluster, HQCluster, and HQCCM41Cluster1. A 'Branch Cluster' label is positioned between the Austin and HQ clusters, and an 'HQ: Headquarter Cluster' label is positioned below the HQCCM41Cluster1. A callout box indicates: 'Click cloud to view elements in cluster'. At the bottom, an 'Alerts' table is visible:

Device Name	Latest Event Time	Event Description	Alert Count	Summary
nmtg-hq-wan-3725.ciscc	27-Feb-2007 13:32:32	Utilization	Critical: 5 Warning: 0 Informational: 0	Registered Phone Count: 20 Unregistered Phone Count: 0
austincm3.cisco.com	27-Feb-2007 13:22:59	Application		
nmtg-sj-ccm-pri.cisco.co	27-Feb-2007 13:00:31	SystemHardware		
<b>Total Count:</b>			5	<b>Total Device Count:</b> 7 <b>Number of Clusters:</b> 4

Two callout boxes provide instructions:

- Drill down into tree hierarchy view Unified Communications devices belonging to cluster
- Drill down into cloud to view logical relationships

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Scenarios 3-43

## Viewing Unified Communications Services

One of the four Monitoring Dashboards in Operations Manager is the Service Level View. This view allows Susan Jones to visualize their Unified Communications deployment by viewing a logical topology of the Unified Communications implementation that focuses on the call control relationships.

The view that is displayed is a real-time auto-refresh display that provides status information about all the Unified Communications clusters and the elements of the clusters in the deployment. The Service Level View is designed so that it can be setup and left running, providing an ongoing monitoring tool that signals you when something needs attention. When a fault occurs in the network, Operations Manager generates an event or events that are rolled up into an alert. If the alert occurs on an element it is shown on the Service Level View.

To launch the Service Level View and view the real-time status information, Susan will follow these steps:

1. The devices managed in the Service Level View have been discovered using the steps from the previous scenario. In order for the devices to be managed by Operations Manager, they must be in the Operations Manager inventory. (Refer to the previous scenario, if you have not completed the discovery.)
2. Launch the Service Level View. The Service Level View is accessible under the [Operations Manager Monitoring Dashboard](#) tab. Either select the [Service Level View](#) menu item under the Monitoring Dashboard tab or click on the [Service Level View](#) picture (*notice that the icon changes when the cursor is placed over the top of it*).
3. By default, the view displays a tree hierarchy and a graphical display of all the discovered Cisco CallManagers clusters. The devices within a cluster can be viewed by opening either the tree hierarchy or the icon representing the cluster (click to open).
4. Click one of the graphical CCM clusters to open to view the logical relationships between the CCM and other devices.
5. As you select one of the clusters either in the tree hierarchy or graphical view, the [Alert Count](#) and [Phone Summary](#) window panes change to reflect the information for the selected cluster.

# Normal Operational Status

## Viewing Unified Communications Services, continue

...

Showing: All IP Communications Devices > HQCluster

Grayed Out Devices  
OM not communicating with device (see below)

Alert on CCM

Dashed Lines Logically Connected

Click to remove / restore views

IP Phones associated with CCM

Most Recent Alerts				Alert Count		Summary	
Device Type	Device Name	Latest Event Time	Event Description	Critical	Warning	Registered Phone Count	Unregistered Phone Count
Router	nmtg-hq-wan-3725.cisco	27-Feb-2007 13:36:32	Utilization	4	0		
MediaServer	austincm3.cisco.com	27-Feb-2007 13:22:59	Application	0	0		
MediaServer	nmtg-sj-ccm-pri.cisco.co	27-Feb-2007 13:00:31	SystemHardware	0	0		
				<b>Total Count:</b>	<b>4</b>	<b>Total Device Count:</b>	<b>Number of Call Managers:</b>

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Scenarios 3-44

## Viewing Unified Communications Services, continue ...

Open one of the CCM clusters to view logical relationships with other devices. Susan opens the cluster view, by using her mouse to either click on it in the tree hierarchy or click on the icon in the graphical display. Continue to learn more about the Service Level View by following these steps:

1. Click the window pane arrows, illustrated above with “remove / restore”, to open or close the tree hierarchy or the summary information at the bottom of the screen. This will allow you to expand the graphical, logical topology view.
2. Click the [More](#) link in the Most Recent Alerts window pane to expand the pane to reflect the Event Time and the Device Type information. This will also close the tree hierarchy, but can be restored by clicking on the window pane arrow.

Note(s):

- As illustrated above, some devices may be grayed out. This occurs when the device is not responding to OM using SNMP queries or is outside the discovery boundaries, but was discovered originally from the CCM discovery.

# Normal Operational Status

## Viewing Service Level Alerts

**Alerts occurring on the CCMs**

**Alerts in both clusters**

**Alerts are listed as "critical"**

The alerts illustrated are only for the IP Telephony devices. Click here to view all Alerts for all devices

Most Recent Alerts		Alert Count		Summary	
Device Name	Event Description	Critical	Warning	Registered Phone Count	Unregistered Phone Count
nmtg-br-ccm-pri.cisco.cc	SystemHardware	2	0	6	0
nmtg-hq-ccm-pri.cisco.c	SystemHardware	0	0		
nmtg-hq-access-4006.ci	SystemHardware	0	0		
<b>Total Count</b>		<b>2</b>		<b>Total Device Count</b>	<b>Number of Clusters</b>
				5	2

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Scenarios 3-45

## Viewing Service Level Alerts

At first glance, Susan notices *critical* alerts occurring within the Cisco CallManager clusters. She can open the CCM cluster in the tree hierarchy (or open the CCM cluster cloud) to view which device(s) in the cluster has an alert. Susan can also see the "Most Recent Alerts" at the bottom of the Service Level View.

The alerts are coming directly from the Cisco CallManagers at both the headquarters and the branch facilities. Let's find out why!

# Normal Operational Status

## Checking All Alerts and Their Events

### Service Level View

Most Recent Alerts			
Device Type	Device Name	Latest Event Time	Event Description
Router	nmtg-hq-wan-3725.cisco	27-Feb-2007 13:36:32	Utilization
MediaServer	austinm3.cisco.com	27-Feb-2007 13:22:59	Application
MediaServer	nmtg-sj-ccm-pri.cisco.co	27-Feb-2007 13:00:31	SystemHardware

Two ways to launch Alerts and Events View

### Monitoring Dashboard



**Cisco Unified Operations Manager**  
Alerts and Events as of Tue 27-Feb-2007 13:43:56 PST

Showing: All Alerts, 5 records ()

#	ID	Device Type	Device Name	Alert Age	Latest Event Time	Latest Event Description	Status
1.	00000RVV	Router	nmtg-hq-wan-3725.cisco.com	349 hr 55 min	27-Feb-2007 13:36:32	Utilization	Active
2.	00000TC	MediaServer	austinm3.cisco.com	116 hr 57 min	27-Feb-2007 13:22:59	Application	Active
3.	00000RU	MediaServer	nmtg-sj-ccm-pri.cisco.com	350 hr 01 min	27-Feb-2007 13:00:31	SystemHardware	Active
	00000RX	VoiceGateway	nmtg-remote-2611.cisco.com	349 hr 55 min	27-Feb-2007 05:18:04	Utilization	Active
	00000RY	MediaServer				Application	Active

Select the **Alert ID** to view the events that caused the alert on the Branch CCM. See next slide.

The Alerts and Events Dashboard illustrates alerts for all devices managed by Operations Manager.

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Scenarios 3-46

## Checking for Alerts

Susan is concerned about the two Cisco CallManagers at the company's headquarters and remote branch locations. The Service Level View provides the administrator with a quick glance at the *recent alerts* on the Unified Communications clusters and the elements of the cluster. In that view, Susan saw alerts related to the system hardware for the CallManagers.

To view *all alerts*, the alert details and events that caused the alert, as well as the alert history, use the **Alerts and Events View**. This view provides real-time information about the operational status of the network.

To launch the Alerts and Events View, Susan will follow these steps:

1. If viewing the Service Level View, simply click the "**Click to View All Alerts**" button, as illustrated above. Otherwise, the Alerts and Events View is accessible under the Operations Manager Monitoring Dashboard tab. Either select the **Alerts and Events View** menu item under the Monitoring Dashboard tab or click on the **Alerts and Events** picture, as illustrated above. (*Notice that the icon changes when the cursor is placed over the top of it.*)
2. The alerts are categorized by device views. By default, there are two views: **All Alerts** and alerts on **Suspended Devices**. Suspended devices are devices in the Operations Manager inventory that are not being monitored by Operations Manager because they have been suspended by an operator. Alerts can still be received from these devices. (*Later in this chapter, you will see how to create a new view to better organize the information based on the devices.*)
3. Select the view **All Alerts** (selected by default).
4. Locate the alerts for the two Cisco CallManagers at the company's headquarters and remote branch locations. Take notice of when the alert was received and how long it has been active.
5. Obtain the events or details of the alert by selecting the alert id.

# Normal Operational Status

## Viewing Alert Details

**Alert Details**  
as of Tue 27-Feb-2007 13:54:30 PST

**Details of alert (events) on Branch CCM**

Device Name: nmtg-sj-ccm-pri.cisco.com Device Type: MediaServer  
Status: Active Alert ID: 00000RU Alert Age: 350 hr 11 min Latest Event Time: 27-Feb-2007 13:54:24

Events: (4)

#	Event ID	Description	Component	Time	Status	Tools	Impact
1.	00005N3	HeartBeatThresholdExceeded	CCM-nmtg-sj-ccm-pri.cisco.com/1	27-Feb-2007 13:54:24	Cleared	-- Select --	None
2.	00005N2	CiscoCCMAttendantConsoleHeartBeatExceeded	CCM-nmtg-sj-ccm-pri.cisco.com/1	27-Feb-2007 13:54:24	Cleared	-- Select --	None
3.	00005MS	InsufficientFreeMemory	RAM-nmtg-sj-ccm-pri.cisco.com	27-Feb-2007 13:00:31	Active	-- Select --	Moderate
4.	00005MR	HighUtilization	PSR-nmtg-sj-ccm-pri.cisco.com	27-Feb-2007 13:00:31	Active	-- Select --	None

Notes:

- Low virtual memory on CCM can be a serious event; view details of event by selecting event id
- Look into which services on CCM are down and determine if that's ok.

- Select each **Event ID** to view the **Event Details** of the event on the CCM
- Select **Impact** of event to determine if it is a known condition and can be cleared

Refresh Acknowledge Clear Notify Close

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Scenarios 3-47

## Viewing Alert Details

In the previous step, Susan selected the Alert ID in the Alerts and Events View to obtain more details about the alert on the CallManager located at the branch office, which launched the Alert Details windows, as illustrated above. This view lists the events that occurred on the device and provides a launch point for more information and tools.

Susan quickly notices the following on in the Alert Details view:

1. The Virtual memory on the system has fallen below the recommended level or threshold. Susan verifies the amount of virtual memory used and the recommended level by clicking the Event ID. (Refer to next page for screen illustration.) Susan also clicks the Impact link "High" to view how this event could impact the overall performance of the device. The Impact report confirms that low virtual memory will cause increased page faults and thrashing which will lead to lower performance.
2. Secondly, Susan notices that several services are down on the CallManager. Susan is not sure which services are not running so after evaluating the virtual memory issue, she will click on the Event ID and the Impact link of the Service Down events to investigate those further.

# Normal Operational Status

## Acknowledging Known Conditions

**CISCO SYSTEMS** **Event Details**  
as of Tue 27-Feb-2007 13:57:08 PST

**Event ID: 00005MS**

Name	Value
Event_Description	InsufficientFreeMemory
Component	RAM-nmtg-sj-ccm-pri.cisco.com
RAMUsed	1007 MB
RAMTotalSize	1024 MB
FreePhysicalMemoryInPercentage	1 %
FreePhysicalMemoryThreshold	15
CurrentFreePhysicalMemoryThreshold	15
CurrentRAMUsed	1010 MB
CurrentFreePhysicalMemoryInPercentage	1 %
CurrentRAMTotalSize	1024 MB

**Confirm**

Are you sure you want to Acknowledge this alert?

Please enter your initials to confirm acknowledgement: admin

**OK** **Cancel**

- All virtual memory is utilized! The percentage available (0%) fell below the threshold of 15%, thus generating the event.
- The system administrator will acknowledge this event with their initials so that others in the group know that someone was alerted to the problem.

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Scenarios 3-48

## Acknowledging Known Conditions

First, Susan looks into the Insufficient Free Virtual Memory event by using these steps:

1. From the Alert Details window (on the previous page), Susan clicked on the **Event ID** for the Insufficient Free Virtual Memory event. The Event Detail window is displayed.
2. From here, Susan can evaluate the total size of the Virtual Memory (1026 MB) and how much of that is being utilized (1025 MB). Almost all of the virtual memory is being utilized, which will cause increased page faults and thrashing and will lead to lower performance as reported by the Impact report. (The Impact report can be viewed by clicking on the Impact link "*High*" in the Alert Details window.) Susan also notices that the recommended level or threshold for free Virtual Memory is set to 15% (or 85 % utilized).
3. Susan clicks the **Acknowledge** button from the Event Details window so that others in her group know that someone was alerted to the event. She will need to enter here initials or name to confirm the acknowledgement.

# Normal Operational Status

## Clearing Known Conditions

The screenshot shows the Cisco Unified Operations Manager interface. At the top, it says "Cisco Unified Operations Manager Service Impact". Below that is a "Go to:" dropdown menu. The main content is a "Service Impact Report" with three sections:

- Alerts:** A table with columns: Severity, Alert ID, Device Name, Device Type, Status. One row is shown: Severity: Critical, Alert ID: 000000S6, Device Name: nmtg-br-ccm-pri.cisco.com, Device Type: MediaServer, Status: Active.
- Associated Events:** A table with columns: Alert ID, Event ID, Description, Component, Status. One row is shown: Alert ID: 000000S6, Event ID: 1023, Description: ServiceDown, Component: nmtg-br-ccm-pri.cisco.com, Status: Active.
- Overall Impact Summary:** A table with columns: #, Impact. One row is shown: #: 1, Impact: Music on Hold feature will be impacted if any of the wav files are not yet translated into codec files.

Below the screenshot, a callout box with an arrow pointing to the impact summary row contains the text: "Review Impact notes for each of the Services that are down. If this is ok and a known condition, then **Clear** the Event."

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Scenarios 3-49

## Clearing Known Conditions

Next, Susan looks into the Service Down events on the Cisco CallManager by using these steps:

1. Going back to the Alert Details window, Susan clicks on the **Event ID** for one of the Service Down events. The Event Detail window is displayed. Additionally from the Alert Details window, Susan also clicks on the Impact link "High" to display the Impact Reports.
2. From the Event Details and Impact reports, Susan can evaluate which services or products are not running. Here are the results:
  - Illustrated above: The Cisco MOH Audio Translator is stopped. The Impact: Music on Hold feature will be impacted if any of the wav files are not yet translated into codec files.
  - The Media Streaming Application is stopped. The Impact: Music on hold, Conference Bridge and Announce applications will not work if this service is down.
  - The Cisco Web Attendant Server is stopped. The Impact: Centralized services and call-control functions will be affected for Cisco WebAttendant and Attendant Console clients and pilot points.
  - The Cisco Messaging Interface is stopped. The Impact: SMDI based integration with the Legacy voice mail systems will be affected.
  - The Cisco Extended Functions is stopped. The Impact: Cisco CallBack and Quality Report Tool Features will not work.
3. Susan is O.K. with these services not running since they do not needed these services. Therefore, she will clear the Event in each of the Event Details windows by clicking the **Clear** button.

# Normal Operational Status

## Email Notification of Alert

The screenshot shows the Cisco Systems Alert Details window. The main window title is "Alert Details" and it shows the device name "nmtg-br-ccm-pri.cisco" and status "Active Alert ID: 00000S6 A". The time is "as of Tue 27-Feb-2007 13:54:30 PST".

On the left, there is a table of events:

#	Event ID	Description
1.	00000UX	InsufficientFreeV
2.	00000UV	ServiceDown
3.	00000UW	ServiceDown
4.	00000UU	ServiceDown
5.	00000UT	ServiceDown

In the center, the "E-mail Notification Recipient(s)" dialog box is open, showing configuration for an email notification:

- SMTP Server: localhost
- Sender Address: tom@abcnetworks.com
- Recipient Address(es): admin@abcnetworks.com
- Subject: Branch CCM
- Message: The virtual memory for the branch CCM needs to be increased. Please confirm. Thank you.

At the bottom of the dialog, the "Send" button is highlighted with a red box and a circled "2".

On the right, a table shows the status of events:

Status	Tools	Impact
23 Acknowledged	-- Select --	None
19 Cleared	-- Select --	None
20 Cleared	-- Select --	None
42 Cleared	-- Select --	None
34 Cleared	-- Select --	None

The "Notify" button in the bottom right of the main window is highlighted with a red box and a circled "1". A blue callout box contains the following text:

- Notice change of event status if you clear or acknowledge an event.
- When all events are cleared, the alert will be cleared.

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Scenarios 3-50

## Email Notification of Alert

After reviewing all the events, Susan goes back to the Alert Details window to review the status of the events that she has either Acknowledged or Cleared (notice the Status change in the illustration above).

One additional item that Susan wants to take care of is to notify their local system administrator of the virtual memory issue so that it can be corrected soon. Susan clicks on the **Notify** button and can then directly from Operations Manager issue an email notification to their system administrator.

Note(s):

- When all events for an alert are cleared, the alert will be cleared in the Alerts and Events dashboard.

# Normal Operational Status

## Checking for Phone Alerts / Outages



- Displays IP Phones that have become disconnected from the switch, are no longer registered to a CCM, or have gone into SRST mode
- Launch test or administration tools to help troubleshoot or view IP Phone details

**Cisco Unified Operations Manager**  
Phone Activities as of Tue 27-Feb-2007 14:16:32 PST

Showing: All Alerts with 1 alerts (Filtered)

#	Extension	IP Address	CCM/CME	Switch Name	Last Change	Description	Tools
1	1301001	172.20.121.197	172.20.121.193	172.20.121.193	2006-01-11 12:53:09	Unregistered	--Select-- Phone Status Test Synthetic Test CCM Admin

**Cisco Unified Operations Manager**  
Phones Detail for Extension: 1301001

IP Address	MAC Address	Model	Protocol	Regd.	CCM	CCM/CME Name	CCM/CME Address	Switch Name	Switch Address	Port	Port Status	VLAN Name
172.20.121.197	0009e89d1353	7940	SCCP	no	CME	172.20.121.193	172.20.121.193	172.20.121.193	172.20.121.193	Fa2/0	up	default

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Scenarios 3-51

## Checking for IP Phone Outages

The last monitoring dashboard that Susan checks on a regular basis is the IP Phone Status dashboard. This display provides real-time information about the operational status of the IP phones in the network. This display is also designed so that it can be set up and left running, providing an ongoing monitoring tool that signals you when something needs attention with an IP phone.

To launch the IP Phone Status dashboard, Susan will follow these steps:

1. The IP Phones managed in the IP Phone Status dashboard need to have their associated CCM and their connecting switch discovered. They should have been discovered using the steps from the previous scenario. (Refer to the previous scenario, if you have not completed the discovery.)
2. Launch the IP Phone Status View. The IP Phone Status View is accessible under the **Operations Manager Monitoring Dashboard** tab. Either select the **IP Phone Status** menu item under the Monitoring Dashboard tab or click on the **IP Phone Status** picture (*notice that the icon changes when the cursor is placed over the top of it*).
3. The Phone Activities window is displayed and shows information about the IP phone(s) in your network that have become disconnected from the switch, are no longer registered to a Cisco CallManager, or have gone into SRST mode. In the ABC network above, one IP Phone has become unregistered with the associated CCM.
4. Susan clicks on the IP Phone **Extension** number in the view. This launches the **Phones Detail** report. Here Susan can easily identify the IP phone and its connecting switch, port, and VLAN and determine if the phone is a known outage. Susan determines that this phone should be out of service.

**<Intentionally Left Blank>**

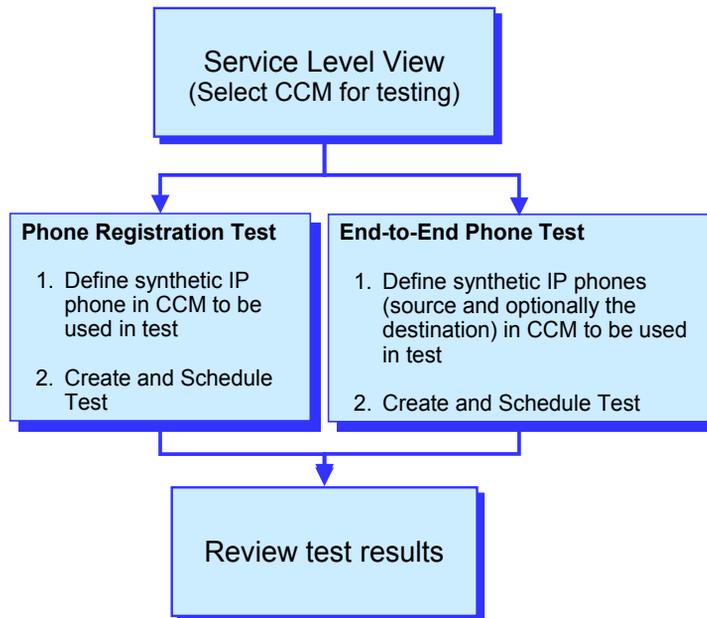


# Service Availability

- Getting Started
- Preparing OM for Initial Use
- Normal Operational Status
- **Service Availability Testing**
- Node-to-Node (IP SLA) Testing
- Experiencing Phone Outages
- Performance Monitoring



# Scenario 4: CCM Service Availability Testing



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Scenarios 3-54

## CCM Service Availability Testing

In this scenario, Susan will create and schedule a phone registration test to continuously check the service availability of the Cisco CallManagers at the company ABC headquarters and branch office.

The phone registration test is a diagnostic test using synthetic transactions created by Operations Manager. The transactions are tests that can be used to measure the availability of voice applications in the network. These tests verify whether the voice application can service requests from a user, such as verifying that phones can register with a Cisco CallManager (CCM).

This scenario goes through the exact steps for configuring this test.

### Note(s):

*You can only configure one Phone Registration test per Cisco CallManager.*

# CCM Service Availability Testing

## Select Headquarters CCM to Test

The screenshot displays the Cisco Operations Manager interface. On the left, a tree view under 'All IP Communications Devices [default]' shows a hierarchy: 'HQ: Headquarter Cluster' (highlighted with a blue box and arrow), 'nmtg-sj-ccm-pri.cisco.com' (marked with a red '1'), and 'SRST Routers' (marked with a red '2'). A blue arrow points from the 'HQ: Headquarter Cluster' to a larger graphical view on the right. This view, titled 'Showing: All IP Communications Devices > HQCluster', shows a central 'Primary CCM' (nmtg-hq-ccm-pri.cisco.com) connected to 'Associated IP Phones' (192.168.142.0/24) via dashed lines. A callout box provides details for the Primary CCM: Name: nmtg-hq-ccm-pri.cisco.com, IP Address: 192.168.152.196, Capability: [MediaServer, CiscoCallManager, Voice Services, Host, Voice and Telephony].

Drill down into CCM cluster

Locate and select CCM in several ways:

1. Service Level View Tree hierarchy of devices
2. Drill down into the graphical CCM cluster

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## Select Headquarters CCM to Test

**To configure this test, first locate the Cisco CallManager (CCM) to test. Susan will use the following steps:**

Open the Service Level View, if not already opened.

Susan can either locate the CCM of interest and select it using the tree hierarchy in the Service Level View or by drill down into the graphical cloud that represents the CCM cluster. Either method produces the logical topology of the CCM cluster illustrated above. The CCMs are always located in the center circle and its logical relationships to other devices are shown with dashed lines.

# CCM Service Availability Testing

## Create Synthetic IP Phones in CCM

The screenshot shows the Cisco Unified Operations Manager interface. The title bar reads "Cisco Unified Operations Manager Service Level View as of Tue 27-Feb-2007 14:44:14 PST". The main window is titled "Showing: SJC-TME-HQCluster". On the left, a tree view shows the hierarchy: SJC-TME-HQCluster > nmtg-hq-ccm-pri.cisco.com > Gateway and Gatekeepers. A right-click context menu is open over the "nmtg-hq-ccm-pri.cisco.com" device. The menu items are: Performance, Suspend Device, Polling Parameters, Threshold Parameters, Delete Device, Group Devices, End-to-End Call Test, Dial Tone Test, Phone Registration Test, Cisco Unified CallManager Administration (highlighted), Cisco Unified CallManager Trace Configuration, Cisco Unified CallManager Quality Reporting, and Cisco Unified CallManager Serviceability. A callout box points to the "Cisco Unified CallManager Administration" option with the text: "Right-mouse click view tools: Launch CCM Administration tool".

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Scenarios 3-56

## Create Synthetic IP Phones in CCM

To create a synthetic test, Operations Manager must simulate other phones. The phone number and MAC address that Operations Manager uses as the simulated phone must be unique on the CCM (no other tests can use it) and configured in the CCM database as a Cisco 7960 phone. The MAC address for simulated phones must be between 00059a3b7700 and 00059a3b8aff.

To define these simulated phones in CCM, launch the CCM Administration tool. To launch the tool, Susan will follow these steps:

- From the Service Level View locate the CCM as described in the previous step.
- Right-mouse click on the CCM. This opens a menu of options which varies for different device types.
- Select the option [More Tools](#). This displays more options.
- Select [Launch CallManager Administration](#).

### Note(s):

Create one phone extension number and one MAC address for each test and use it for that test only.

Make sure that the combination of the phone extension number and the MAC address used in a test is unique across the voice cluster.

# CCM Service Availability Testing

## Create Synthetic IP Phones in CCM

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Scenarios 3-57

## Create Synthetic IP Phones in CCM

Now, create a new phone definition in the CallManager to be used in the synthetic test. This phone is a simulated phone and not a real phone. Using the CallManager Administration tool, define the IP Phone. It must be a Cisco 7960 phone and the MAC address for simulated phones must be between 00059a3b7700 and 00059a3b8aff.

### To define a simulated phone in CCM, Susan will follow these steps:

Launch and login to the [CallManager Administration](#) as described in the previous step.

From the CCM Administration tool, select from the menu [Device> Add a new Device](#).

Change the Device Type from the pull-down menu to [Phone](#). Click [Next](#).

The Phone type for the simulated phone must be a [Cisco 7960](#). Select this model as the Phone type. Click [Next](#).

In the Phone Configuration window, enter a MAC address between 00059a3b7700 and 00059a3b8aff. The Description field will be automatically filled in by the tool. Other required fields are the Device Pool and Button Template. Use the default. Click [Insert](#).

The new IP Phone to be used in the synthetic test has been created.

# CCM Service Availability Testing

## Create Phone Registration Test

### Service Level View

End-to-End Call Test

Dial Tone Test

Phone Registration Test

Cisco Unified CallManager

• CCM name/address already populated from right-mouse click on selected CCM

• Otherwise, select from list and populated CCM field by clicking on triangles

Test Type: Phone Registration Test

Select Voice Application

- CS@PCOM-DEMO2
- OM@PCOM-DEMO2
- System Defined Groups
- Cisco IP Telephony Applications
- 78XX Media Servers
- Cisco CallManager or Cluster
  - VE-SJC-TME-BranchCluster
    - 78XX Media Servers
    - nmtg-br-ccm-pri.cisco.c
  - VE-SJC-TME-HQCluster
    - 78XX Media Servers
    - nmtg-hq-ccm-pri.cisco.c

Phone Parameters

Cisco CallManager: nmtg-hq-ccm-pri.cisco.c

Synthetic Phone MAC Address: 00059a3b7700

Run

now

every 1 minutes

between 0 : 0 and 23 : 59

every day

Mon  Tue  Wed  Thu  Fri  Sat  Sun

Test Name: HQ CCM Reg Test

Create Cancel Help

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Scenarios 3-58

## Create Phone Registration Test

Once the simulated IP Phone(s) have been defined in the CCM, Susan will use Operations Manager to configure a synthetic test to occur on a regular basis to test the service availability for registering phones with the CCM. The phone registration test is a diagnostic test in Operations Manager using synthetic transactions. The transactions are tests that can be used to measure the availability of voice applications in the network. These tests verify whether the voice application can service requests from a user, such as verifying that phones can register with a Cisco CallManager (CCM).

The test configured here will continuously test whether the CCM at the headquarters can register the simulated IP Phone just created. To create the Phone Registration Test, Susan will follow these steps:

From the Service Level View locate the headquarters CCM as described in the earlier steps.

Right-mouse click on the CCM. This opens a menu of options which varies for different device types.

Select the option [Phone Registration Test](#). The Create Synthetic Test window is displayed and the test type is set to Phone Registration Test.

Since the test configuration was launched using the right-mouse click on the CCM of choice in the Service Level View, the Cisco CallManager field is already filled in. However, if the test is launched from the Operations Manager home page, the user can select the CCM using the tree hierarchy on the left of the window.

Enter the MAC address of the IP Phone that was defined in CCM and created on the previous page. Remember the MAC address must be between 00059a3b7700 and 00059a3b8aff.

Define the frequency for running the test. Susan wants to continuously run the test everyday to check for CCM service availability.

Click [Create](#) when done.

**An additional test can be created using the above steps to also check the service availability of the Cisco CallManagers at the branch office.**

# CCM Service Availability Testing

## Create End-to-End Call Test

### Service Level View

**TIPS:**

- Run multiple End-to-End Call Tests with source phones in different partitions using different CCMs
- Run tests calling the lobby phone or tests calling international phones to provide comprehensive reports on CCM service availability

**Real IP Phone: Enable RTP Transmission – OM sends RTP stream to destination (.wav file)**

**Source phone is a synthetic phone in CCM**

**Destination phone can be real or synthetic**

**Schedule test to run**

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## Create End-to-End Call Test

Again, once the simulated IP Phone(s) have been defined in the CCM, Susan will use Operations Manager to configure a synthetic test to occur on a regular basis to test the service availability for making end-to-end calls in different partitions of the network.

The End-to-End Call Test verifies whether the CCM can initiate and complete end-to-end calling: phone requests/receives a dial tone from CCM, digits sent, ring indication received. To create the End-to-End Call Test, Susan will follow these steps:

From the Service Level View locate the headquarters CCM as described in the earlier steps.

Right-mouse click on the CCM. This opens a menu of options which varies for different device types.

Select the option **End-to-End Call Test**. The Create Synthetic Test window is displayed and the test type is automatically set to End-to-End Call Test.

Since the test configuration was launched using the right-mouse click on the CCM of choice in the Service Level View, the Cisco CallManager field is already filled in. However, if the test is launched from the Operations Manager home page, the user can select the CCM using the tree hierarchy on the left of the window.

Enter the MAC address of the **source IP Phone** that was defined in CCM and created earlier. Remember the MAC address must be between 00059a3b7700 and 00059a3b8aff.

Define the **destination phone** for the test. The destination can be another synthetic phone defined in the same or another CCM or the destination can be a real device. Based on which type you choose, the parameters will change and be grayed-out for what is not needed. If synthetic, provide a CCM, MAC address, and extension; if real, provide only the phone extension;

Define the frequency for running the test. Susan wants to continuously run the test everyday to check for CCM service availability. Click **Create** when done.

**A valuable use of this test is to create multiple tests that simulate the calls of phones in different partitions of the network. Run tests to ensure that calls be made to the phone in the lobby, to the phones in remote locations, and to international phones.**

# CCM Service Availability Testing

## Review Test Results

The screenshot displays the Cisco Unified Operations Manager interface. At the top, it says "Cisco Unified Operations Manager Service Level View as of Tue 08-Nov-2005 12:17:37 PST". The main area is divided into a left sidebar with a tree view of devices and a main content area. The tree view shows a hierarchy starting with "SJC-TME-HQCluster", which contains "nmtg-hq-ccm-pri.cisco.com" and "Gateway and Gatekeepers". Below this is "SJC-TME-BranchCluster" with "nmtg-br-ccm-pri.cisco.com", and then "All Devices" with "CS@PCOM-DEMO2", "OM@PCOM-DEMO2", and "System Defined Groups" including "Cisco IP Telephony Application" and "CallManagers". The main content area shows "Showing: SJC-TME-HQCluster" with a globe icon and IP address "192.168.140.66". A right-click context menu is open over the globe icon, listing options: "Alert History", "Alert Details", "Associated Phones", "Performance", "Operations Manager Device Center", "Suspend Device", "Polling Parameters", "Delete Device", "Threshold Parameters", "Connectivity Details", "Detailed Device View" (highlighted in blue), "Group Devices", and "More Tools". A callout box with a blue border and white background points to the "Detailed Device View" option, containing the text: "Right-mouse click either to open Detailed Device View of CCM". At the bottom left, there is a "Phone Search" field and a "Click to View All Phones" button. The footer contains "Operations Manager Tutorial", "© 2007 Cisco Systems, Inc. All rights reserved.", and "Scenarios 3-60".

## Review Test Results

**The Phone Registration Test is now up and running on a continuous basis. To view information about the test and the results, as well as other information about the CCM, Susan will use the Detailed Device View in Operations Manager. One way to launch this view is by following these steps:**

- From the Service Level View locate the headquarters CCM as described in the earlier steps.
- Right-mouse click on the CCM. This opens a menu of available options for the CCM.
- Select [Detailed Device View](#) from the pop-up menu. (see next page)

**The Detailed Device View can be started in several other ways. For example, click the Device Name in a report or the device link in another view.**

# CCM Service Availability Testing

## Review Test Results, continue ...

**Obtain details about the selected CCM**

ID	Name	State	Status	Time Stamp	Error Message	Availability (%)	Associated Application	Failure (%)	Interval (min)	Test Type
1.	Phone_Reg	Failed	Failed	Tue 09-Jan-2007 23:01:04 EST	The Cisco CallManager did not accept the phone registration.	0	CCM-nmtg-sj-ccm-pri.cisco.com/1	100	1	Phone Registration Test

**Select Application> Synthetic Tests to view all tests configured and running**

**Also view Synthetic Tests created from: Diagnostics> Synthetic Tests tab**

- OM uses Perfmon counter objects on CCM platforms to collect performance counters.
- Voice Utilization Settings, disabled by default, must be enabled to collect performance and capacity data.
- Refer to **Administration>Polling and Thresholds > Polling Parameters** for the device group

Refresh

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## Review Test Results, continue ...

**The Detailed Device View provides extensive information on the selected device and the device's components. Susan launched the Detailed Device View on the CCM with the Synthetic Tests. To review the test and the test results, follow these steps.**

From the Detailed Device View (started in the earlier steps), use the tree hierarchy and open the **Application** tree.

Locate and select **Synthetic Tests** in the tree hierarchy, as illustrated above. This will display all the synthetic tests configured and running on the device.

Review the test information. Notice that Susan will receive an alert in Operations Manager if either of the tests fail more than 50% of the time.

### In the Detailed Device View, you can do also do the following:

View hardware and software information on system, environment, connectivity, and interface components

View hardware and software information on subcomponents of aggregate devices

View application status for Cisco CallManager, Voice Services, Work Flow, and Synthetic Tests (illustrated above), and provide launch points for administrative pages, if appropriate

Suspend or resume management of a device or a device component so the device is no longer polled, or polling is resumed

Launch other Operations Manager tools

**<Intentionally Left Blank>**



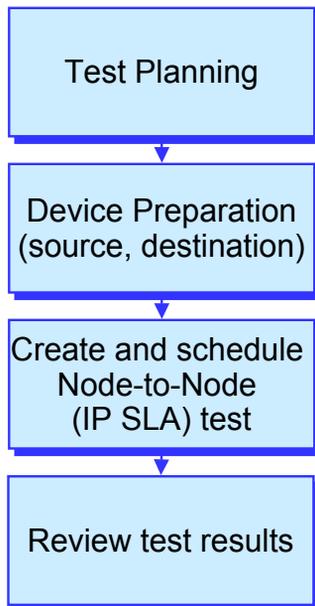
# Node-to-Node (IP SLA) Testing

- Getting Started
- Preparing OM for Initial Use
- Normal Operational Status
- Service Availability Testing
- **Node-to-Node (IP SLA) Testing**
- Experiencing Phone Outages
- Performance Monitoring



# Scenario 5: Node-to-Node Testing

## Outline



## Node-to-Node (IP SLA) Testing

Node-To-Node tests monitor the response time and availability of multi-protocol networks on both an end-to-end and a hop-by-hop basis.

At Company ABC site-to-site communications is being deployed across the IP network. Continuously monitoring of its quality is crucial to its business operations. Susan knows that voice and video are more sensitive to network delays. Thus, the Node-to-Node test in Operations Manager (test type Data Jitter) can be used to simulate voice traffic from the headquarters to the remote site and measure the response time of the traffic. After collecting this data, Susan can use the graphing function in Operations Manager to examine changes in network performance metrics in real-time.

This scenario will look over the shoulder of Susan and watch her select the devices used in the test, ensure that they are properly configured, create the Node-to-Node test (Data Jitter), and look at the preliminary results.

Other tests besides Data Jitter are also available in Operations Manager. Chapter 2 of this tutorial provides additional details on all the Node-to-Node tests available.

# Node-to-Node (IP SLA) Testing

## Test Planning

### Reason for Test

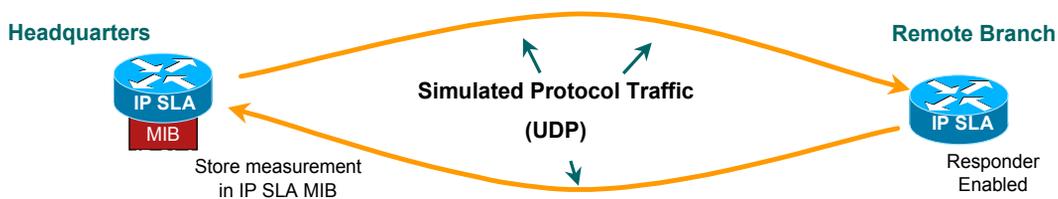
- Ensure Voice Quality is acceptable in the network (headquarters to remote branch) by running a Data Jitter Test

### Measurements / Metrics

- **Round Trip Latency** **Packet Loss** **Network Jitter** **Dist. of Stats** **Connectivity**

### Test Parameters

- End Points: Select IP SLA device at headquarters to initiate test traffic
- Protocol to Simulate (UDP)
- Threshold to detect condition – 3% packet loss, 40 ms jitter (either direction)



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Scenarios 3-65

## Node-to-Node (IP SLA) Testing – Test Planning

Start with a plan, and the rest will be easy. In this scenario, Susan, our network engineer, came up with a monitoring plan and has highlighted the following key points:

- Site-to-site communications is being deployed across the IP network. Continuous monitoring of voice quality is crucial to business operations.
- The Node-to-Node test in Operations Manager (test type Data Jitter) will be used to simulate voice traffic from the headquarters to the remote site and measure the response time of the traffic.
- Since many network design changes will be occurring throughout the year, the end-to-end network latency tests will run continuously to ensure consistency in the network latency.
- Cisco's IP SLAs feature embedded in Cisco IOS routers will be used to simulate the traffic and measure the latency and jitter. Since the test will be continuously run for a long period of time, the network administrators may wish, at a later date, to deploy some unused Cisco 2500 routers that they have sitting on the shelf for the source device and the target device instead of production routers. The target device at the remote branch must also be a IP SLA capable router to monitor voice traffic and report on Jitter statistics.
- Susan knows that voice and video are more sensitive to network delays. Thus, running additional tests and varying the IP Precedence level from 5 to other values can help to evaluate the importance of using various QoS features in routers by prioritizing delay sensitive traffic in the network.
- The conditions to look for will be a 3% packet loss or 40 ms jitter (either direction). For more information on what jitter is, please refer back to Chapter 2 of this tutorial.

# Node-to-Node (IP SLA) Testing

## Device Preparation

### Source Device (Headquarters)

- IP SLA capable and enabled; verify IOS version supports IP SLA test operation
- SNMP community strings (RO, RW) configured on device
- SNMP trap recipient defined (I.e. Operations Manager server)
- Device managed in the Operations Manager inventory and the device credentials configured in the DCR match those on device

Step	Action
1	router> <b>enable</b>
2	router# <b>configure terminal</b>
3	router(config)# <b>snmp-server community &lt;string&gt; ro</b>
4	router(config)# <b>snmp-server community &lt;string&gt; rw</b>
5	router(config)# <b>snmp-server host &lt;IP_address&gt; &lt;trap_community_string&gt; rtr</b>
6	router(config)# <b>snmp-server enable traps rtr</b>

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Scenarios 3-66

## Node-to-Node (IP SLA) Testing – Device Preparation

Once the source of the test operation has been identified and the device has been selected at our headquarter location, the source device will need to be configured.

First, check the IOS version of the source device. IOS release 11.2 is the earliest and first release that support the IP SLAs (formerly known as RTR or SAA). Note that not all SLAs test operations are supported in later IOS releases.

Additionally, a few device configuration commands need to be configured in order to configure IP SLAs using Operations Manager and have IP SLA-related traps forwarded to a network management station (NMS). These commands are outlined in the figure above and discussed below.

- Operations Manager uses SNMP to define the IOS IP SLA and to extract the data in the IP SLA MIB in the source device. Both the SNMP read-only (ro) and read-write (rw) community strings need to be configured on the source device.
- Optionally, to receive traps at a NMS, like the Operations Manager server, when a test exceeds a specified latency threshold, verify that the source device is set up to send IP SLA-generated traps. The SNMP keyword rtr limits the traps sent to the specified address to IP SLA-related traps. If the keyword rtr is omitted, all default SNMP traps are sent to the named network management host including IP SLA-related traps.

Step	Action
1	router> <b>enable</b>
2	router# <b>configure terminal</b>
3	router(config)# <b>snmp-server community &lt;string&gt; ro</b>
4	router(config)# <b>snmp-server community &lt;string&gt; rw</b>
5	router(config)# <b>snmp-server host &lt;IP_address&gt; &lt;trap_community_string&gt; rtr</b>
6	router(config)# <b>snmp-server enable traps rtr</b>

# Node-to-Node (IP SLA) Testing

## Device Preparation

### Target Device (Remote Branch)

- This scenario uses the Data Jitter Test:
  - Target device must also be an IP SLA capable device,
  - Responder must be enabled (refer to notes)
  - Cisco IOS version 12.1(2)T or later
- Other tests (Echo, Path Echo): Target device can be any reachable IP host

Step	Action
1	<code>router&gt; enable</code>
2	<code>router# configure terminal</code>
3	<code>router(config)# snmp-server community &lt;string&gt; ro</code>
4	<code>router(config)# rtr responder</code>

Starting with IOS 12.3(14)T, the keyword "rtr" in the IOS command line interface will be replaced with "ip sla".

## Node-to-Node (IP SLA) Testing – Device Preparation

Once the target or destination of the test operation has been identified and the device has been selected at our headquarter location, the target device may also need to be configured.

In most test operations (Echo, Path Echo), the destination can be any IP host. Of course, the host must be reachable by the source device, but no other configuration is needed.

In this scenario, we want to use the Data Jitter test to measure voice quality. This type of test requires a Cisco IOS Device with the IP SLA Responder enabled - A target device that is running Cisco IOS software can be configured as a Responder, which processes measurement packets and provides detailed timestamp information. The device must be reachable by the source device. If the SNMP read community string is configured, then Operations Manager can read the device information, the IP SLA version, and determine if the responder is enabled. To use the IP SLAs Responder feature, it must be enabled, using the command below.

Note(s):

- Starting with IOS 12.3(14)T, the keyword "rtr" in the IOS command line interface will be replaced with "ip sla".
- Certain test operations, like Data Jitter, use the IP SLA functionality in Cisco routers at the destination device. To enable the RTR responder in the IP SLA router, issue the following command under the global configuration mode:

```
router(config #) rtr responder
router# show rtr responder
```

- Use the following show command to verify which IP SLA operations are available in the Cisco IOS device.

```
router# show rtr application
```

# Node-to-Node (IP SLA) Testing

## Select Source Device to Configure Test

The screenshot shows the Cisco Unified Operations Manager Service Level View dashboard. The main area displays a network diagram with various devices and their capabilities. A yellow callout box highlights a device with the IP address 192.168.137.93, listing its capabilities: [VoiceGateway, CallManager Express, VoiceServices, IP SLA, H323, Router, Routers]. A red circle is drawn around 'IP SLA' in this list. A blue callout box points to this device with the text 'Source device must be IP SLA capable'. Another blue callout box points to the device with the text 'Right mouse click on source (IP SLA) device'. A third blue callout box at the bottom left says 'Could also launch using Diagnostics > Node-to-Node Tests > Create'. On the right side, a 'More Tools' menu is open, showing options like 'SRST Test', 'Node-to-Node Tests Summary', 'End-to-End Call Test', 'Dial Tone Test', 'Node-to-Node Test' (highlighted in green), 'Phone Registration Test', 'CallManager Express Administration', and 'Gateway Administration Network Analysis Module'. A blue arrow points from the 'Node-to-Node Test' option to the right with the text 'See next slide'.

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Scenarios 3-68

## Select Source Device to Configure Test

Operations Manager has several ways to create a Node-to-Node diagnostic test.

One way is to use the home page of Operations Manager.

1. Select **Diagnostics > Node-to-Node Tests**. The Node-to-Node Tests page appears and lists all currently configured tests, if any exist.
2. Click **Create** to configure a new test. (Illustrated on next page.)

Another way is to use the context sensitive menus in the Service Level View dashboard, as illustrated above. If a device is capable of generating a Node-to-Node test, the test will be displayed in the menu options when you right-mouse click on it.

1. Locate the source device in the **Service Level View** dashboard. Ensure that the device is IP SLA capable by simply placing the cursor over the device in the view.
2. Right-mouse click on the device.
3. Select **Node-to-Node Test**. The Node-to-Node Tests page appears and will have the source device field completed with the device that you selected in the Service Level View dashboard. (The **Node-to-Node Test Summary** menu option displays all tests currently configured, if any exist.)

# Node-to-Node (IP SLA) Testing

## Configure Node-to-Node (IP SLA) Test

Node-to-Node Test Configuration

Test Type: Data Jitter

1 Select protocol to simulate

Source

2 Source Device at Headquarters already selected from previous step (right mouse click)

3 Target Device at Remote Branch Site chosen from device selector (Make sure rtr responder is enabled on device)

4

5

6 Schedule Test

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## Configure Node-to-Node (IP SLA) Test

The information required for creating a Node-to-Node test are different for each test operation type. In this scenario, Susan wants to ensure that voice quality is acceptable in the network (headquarters to remote branch) by using a Data Jitter test. Susan will follow these steps to configure this test on the source device.

1. In the Test Type pull-down menu select **Data Jitter**.
2. In the **Source** pane, the source device should already be entered since the test was started by right-mouse clicking on the device from the Service Level View. If not the right device, use the device selector to the left and select a source device that meets the requirements stated earlier.

Select a **source interface** setting. You can leave it as **Default**, or enter a new setting.

3. In the **Destination** pane, use the device selector on the left to select a destination device that meets the requirements stated earlier for the target device.

Enter a **UDP port** for the destination device (the default value is **16400**). This is the port on the destination device to which packets are sent by the source device.

Note that if you want to switch the source and destination devices with each other, click the *Swap Source and Destination* button.

4. In the **Parameters** pane, set the following parameters:
  - Codec – Select one type. It is used to determine the packet interval and the request payload.
  - Call Duration – must be less than 60 seconds and is the time of the call simulated
  - Voice Quality Expectation – Select one. This selection corresponds to the Access Advantage factor of Mean Opinion Scores (MOS) and Calculated Planning Impairment Factor (ICPIF).
  - IP QoS – Defines the packet header settings for the simulated traffic and is used by the interconnect devices to prioritize packets based on quality of service policies.

<steps continue from previous page... >

5. In the **Threshold** pane you can change the following settings:
  - a. Source to Destination threshold – the default threshold setting is 3% (packet loss) and 40 msec (jitter)
  - b. Destination to Source threshold – the default threshold setting is 3% (packet loss) and 40 msec (jitter)
  - c. Average Latency – the default threshold setting for latency is 300 m/secs
  - d. Node-to-Node Quality – the setting can range from Excellent to Poor is the the threshold setting for the test's quality. Set the field to **Fair**.
6. In the **Run** pane, configure when the test should run. In this scenario, we want the test to continuously run at defined interval. Therefore, do the following.
  - a. Select the schedule radio button.
  - b. Choose to run the test every 3 minutes to provide a level of granularity desired.
  - c. Run the test all day.
  - d. Choose to run the test everyday, including weekends.
  - e. Enter a test name. The test name cannot contain tabs, question marks, quotation marks, asterisks, semicolons, commas, colons, forward slashes, straight slashes, or backslashes.
7. Click **OK** when ready to configure.
8. If the SNMP RW community string credential has not been set for the source device, you will be prompted for it. You can also define these credentials by using the Operations Manager task **Devices>Device Credentials**.

Note(s):

- The other Echo tests also provide response time information and do not require another IP SLA device as the target, but they do not provide the Jitter measurement.
- Also note that there is a test to measure call setup time using SIP or H323 and a test to measure the time required for a gateway to register with a gatekeeper.

# Node-to-Node (IP SLA) Testing

## Verifying Test Execution

The screenshot shows the Cisco Unified Operations Manager interface. The top navigation bar includes 'Monitoring Dashboard', 'Diagnostics', 'Reports', 'Notifications', 'Devices', and 'Administration'. The 'Diagnostics' menu is expanded to show 'Node-to-Node Tests'. A table lists the tests, with one test selected. The 'View' button for this test is highlighted. Below the table, the 'Node-to-Node Test Details' window is open, showing general and schedule parameters for the selected test.

Test Name	Source	Destination	Operation	Details	Status
<input checked="" type="checkbox"/> HQ- Branch test	nmtg-voice-srst.cisco.com	nmtg-hq2-6506.cisco.com	Data Jitter	1 min - 00:00 to 23:59 - all days	Running

**Node-to-Node Test Details**

**General Parameters**

Test Name: HQ- Branch test Excerpt from full report

Operation Type: Data Jitter

Source: nmtg-voice-srst.cisco.com

Source Interface: Default

IP SLA Responder: nmtg-hq2-6506.cisco.com

Current Status: Running

Admin Index: 86052

Data Directory: C:\PROGRA~1\CSCOpx\data\N2ntests\HQ- Branch test

**Schedule Parameters**

Polling Time: Between 00:00 and 23:59

Occurrence Pattern: Run on Mon, Tue, Wed, Thu, Fri, Sat, Sun

- If the Status has an error, details of the error can be found here in the test details.
- Common errors are due to the SNMP RW community strings in the OM device credentials not matching those on the device or the device is low on memory.

## Verifying Test Execution

You can verify whether a test ran and completed correctly. You can also troubleshoot the test, if necessary, by following these steps:

1. Select **Diagnostics > Node-To-Node Tests**. The Node-To-Node Tests page appears. All current Node-To-Node tests appear in this page. The last column in the table shows the status of each test.
  - Configuring - Either the device is not responding or configuration of the test is under way.
  - Scheduled - Displays after you create or update a test. The status will change to "Running" at the first polling cycle.
  - Running - The test is active and collecting data.
  - Delete Pending - Intermediate state, before the test is deleted. No actions can be performed on the test.
  - Suspended - The test is suspended from data collecting or polling. This occurs because the device was suspended.
  - Dormant - The test is active but not currently collecting data. Tests are in the Dormant state between polling cycles.
  - Error - The test was not configured correctly. Possible problems include incorrect device credentials or low device memory. You can see more information on why the test configuration failed by viewing the details in the Current Status field when selecting the **View** button.
2. Click **View** to review the test configuration parameters. The illustration above only displays some of the parameters; the other parameters that are viewable are the operation-specific parameters (IP Precedence value, Codec, UDP port used, threshold values, and more).

# Node-to-Node (IP SLA) Testing

## Graphing Test Results

The screenshot shows the Cisco Unified Operations Manager interface. The top navigation bar includes 'Monitoring Dashboard', 'Diagnostics', 'Reports', 'Notifications', 'Devices', and 'Administration'. The 'Diagnostics' menu is expanded to show 'Node-to-Node Tests'. A table lists three tests: 'DataJitter-3min', 'HQ-Branch-test', and 'roadshow-demo'. The 'roadshow-demo' test is selected. A 'Select Metrics' dialog box is open, showing a list of metrics with checkboxes. The 'Trend' button is highlighted, and a 'View Graph' button is also visible. A callout box explains that metrics must be of the same units when selected for graphing.

Test Name	Source	Destination	Operation	Details	Status
1. DataJitter-3min	192.168.137.93	nmtg-demo-2955L.cisco.com	Data Jitter	3 min - 00:00 to 23:59 - all days	Deleting
2. HQ-Branch-test	nmtg-voice-srst.cisco.com	nmtg-hq2-6506.cisco.com	Data Jitter	1 min - 00:00 to 23:59 - all days	Running
3. roadshow-demo	192.168.140.49	nmtg-demo-3750.cisco.com	Data Jitter	1 min - 00:00 to 23:59 - all days	Running

**Select Metrics**

Metric Name	Selected
Source to Destination Packet Loss (%)	<input type="checkbox"/>
Destination to Source Packet Loss (%)	<input type="checkbox"/>
Source to Destination Jitter (Milliseconds)	<input checked="" type="checkbox"/>
Destination to Source Jitter (Milliseconds)	<input checked="" type="checkbox"/>
Average Latency (Milliseconds)	<input checked="" type="checkbox"/>
Node-to-Node Quality (Number)	<input type="checkbox"/>

• Select metrics to graph  
• When selecting multiple metrics, they must be of the same units

## Graphing Test Results

Node-To-Node tests monitor the response time and availability of multi-protocol networks on both an end-to-end and a hop-by-hop basis.

The Data Jitter test, created in this scenario, uses the UDP protocol to measure latency, one-way jitter, and packet drop. Jitter is interpacket delay. The source device sends a number of packets from the source device to the destination device with a specified interpacket delay. The destination (an IP SLA Responder) time stamps the packet and sends it back. Using this data, the one-way positive and negative jitter (from the source to the destination and back again), packet loss (also from the source to the destination and back again), and round trip latency are obtained.

Positive jitter occurs when the one-way delay for a packet is longer than the previous packet delay. Negative jitter occurs when the one-way delay for a packet is shorter than the previous packet delay. If the sequence numbers become jumbled, the test reflects the error.

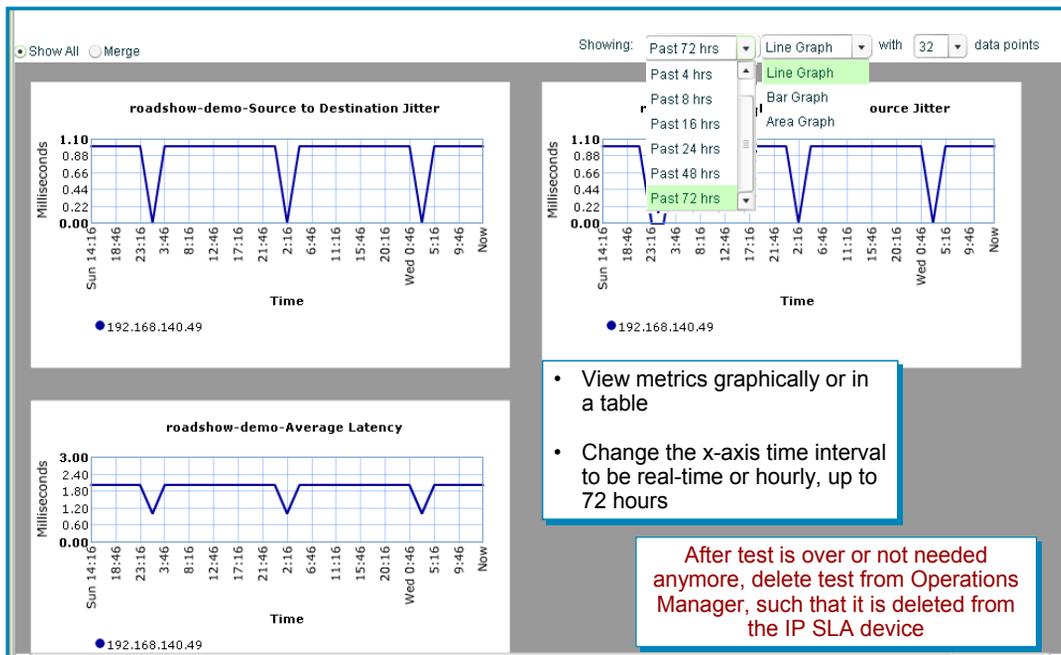
After running the test for awhile, Susan can use the Operations Manager graphing function to examine changes in network performance metrics. She can select, display, and chart network performance data in real-time. To view / graph the test results, Susan follows these steps:

1. Select **Diagnostics > Node-To-Node Tests**, if not already at the Node-To-Node Tests page. All current Node-To-Node tests appear in the page.
2. Select the Jitter test by selecting the checkbox next to its name.
3. Click the **Trend** button.
4. Select one or more metrics to graph. The metrics must be of the same units to graph together. The illustration above graphs the latency against the jitter in milliseconds.
5. Click the **View Graph** button.

Node-To-Node tests can also be configured to trigger events when certain thresholds are crossed. These events (Alerts on a device) appear in the Monitoring Dashboard displays.

# Node-to-Node (IP SLA) Testing

## Review Test Results



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Scenarios 3-73

## Review Test Results

Operations Manager allows Susan to select and examine changes in network performance metrics. She can select, display, and chart network performance data generated by the Node-to-Node test. By selecting the statistics from the previous dialog and selecting the **View Graph** button, Operations Manager displays the performance metrics as a graph or in tabular format.

Up to four graphs can be plotted at one time.

To choose either a graph or tabular display, choose the desired tab located at the top right of the page, under the window tools area. There are three types of graphs that you can display: line graph, bar graph, or area chart. Choose the type of graph you want displayed by selecting it from the Type of Graph pull-down menu located on the top right of the graph.

The information in a graph can be viewed as a snapshot in time or it can be refreshed at regular intervals by selecting a time interval or Real Time from the Time Interval pull-down menu located above the graph.

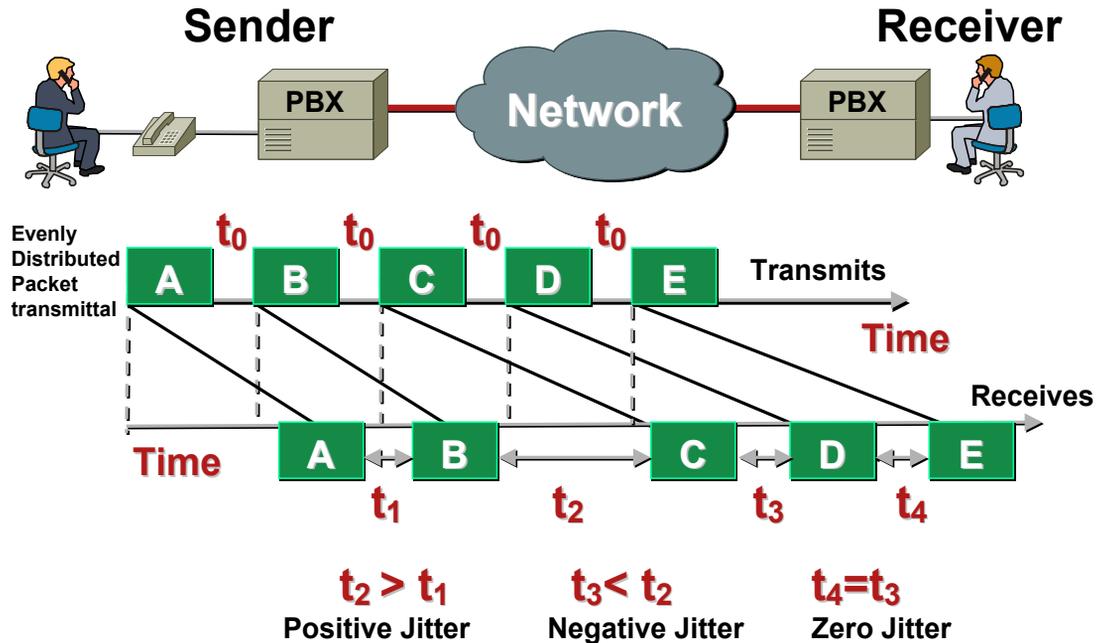
Susan is very pleased with the latency and jitter values seen here in real-time. She will leave the test running and if at any point certain thresholds are crossed, these events will appear in the Monitoring Dashboard displays as alerts on managed devices.

Note(s):

- The data files for the node-to-node performance metrics are located on the server, in the <OM installed directory>\data\N2Ntests directory. The data files in this folder are purged after 31 days.
- If you select a device that does not have data available for the selected time interval, a message appears stating such. An empty graph appears. The graphical display opens, but it does not automatically refresh even if Real Time is selected in the Time Interval pull-down menu. You must manually refresh the data by using the browser refresh after a period of time. Once the graph displays data, if Real Time is selected, the graph will refresh automatically. At any time, you can change the time interval to get historical information, if there is any.

# Node-to-Node (IP SLA) Testing

## Understanding Jitter



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Scenarios 3-74

## Understanding Jitter

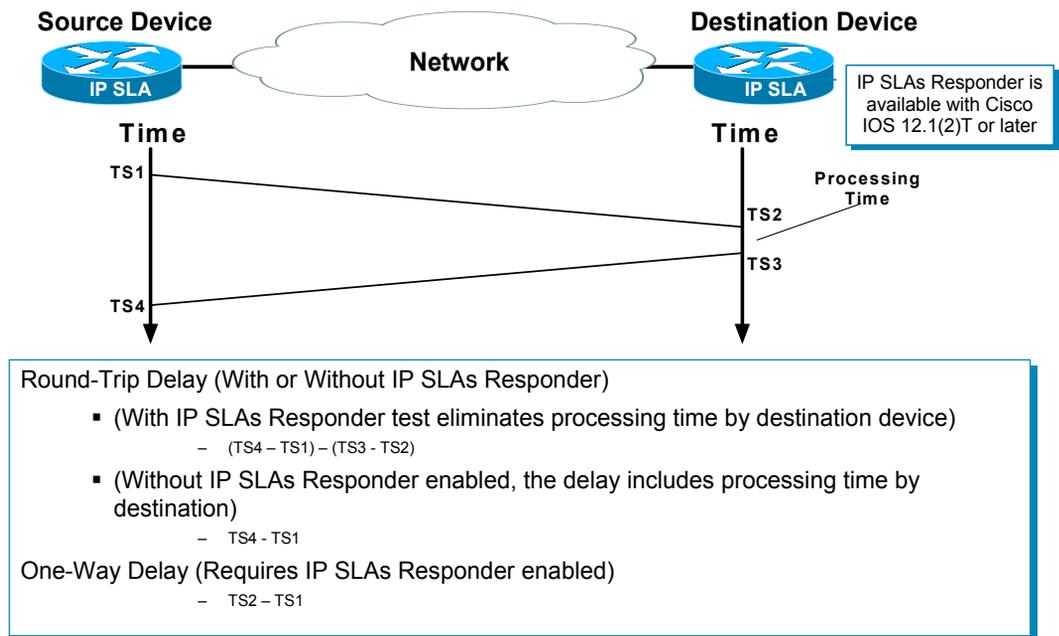
If a source device sends multiple packets consecutively to a destination at ten millisecond intervals, and if the network is operating optimally, the destination should receive them at ten-millisecond intervals.

However, delays (i.e. queuing, or arriving through alternate routes) in the network can cause inter-packet arrival delay of greater or less than ten milliseconds.

Positive jitter implies that the packets arrived at a packet inter-arrival time greater than the inter-arrival time of the previous packet. If the previous packet arrived 10 milliseconds apart from its previous packet and this packet arrived 12 milliseconds from its previous packet, then positive jitter is equivalent to two milliseconds. Negative jitter is computed similarly. Greater value for positive jitter is undesirable for voice networks, and a jitter value of zero is ideal for delay-sensitive networks.

# Node-to-Node (IP SLA) Testing

## Understanding Round Trip Latency



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Scenarios 3-75

## Understanding Round Trip Latency

This figure can help you to understand how the round trip latency values are computed.

As illustrated, when using the IOS Responder as the destination device (available in Cisco IOS version 12.1(2)T or later), processing delays can be minimized by computing the destination's processing delay time and subtracting it from the total round-trip time.

Routers sometimes take tens of milliseconds to process incoming test packets, due to other high priority processes. This delay affects the response times computed, because the reply to test packets might be sitting on queue while waiting to be processed. Therefore, the response times would not accurately represent true network delays.

IOS IP SLAs minimize these processing delays on the source device as well as on the destination router (if the IOS Responder is being used), in order to compute true round-trip times. It does so by time stamping the test packets at the destination device.

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# Experiencing Phone Outages

- Getting Started
- Preparing OM for Initial Use
- Normal Operational Status
- Service Availability Testing
- Node-to-Node (IP SLA) Testing
- **Experiencing Phone Outages**
- Performance Monitoring



# Scenario 6: Experiencing Phone Outages

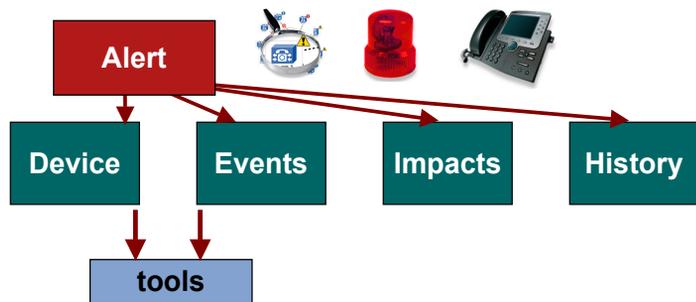
## Outline

Users are calling in & experiencing problems with using their IP phones.

Locate IP Phone, connecting switch, associated CCM and look for alerts

Drill down for more detailed information

Launch other diagnostic troubleshooting tools to locate problem



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Scenarios 3-78

## Experiencing Phone Outages

This scenario looks at the work flow for helping to diagnose IP phone related problems using Operations Manager. Users are calling and reporting periodic clipping or outages. The Help Desk collects information from the users and then utilize the features in Operations Manager to help diagnose the problems.

Let's follow along. (This scenario assumes that the previous scenarios have been completed.)

# Experiencing Phone Outages

## Collect Important Information

### Employee:

- Called to complain of poor quality using the IP phones.
- The Help Desk operator collects important information from the caller.

### Help Desk:

- What is the employee's name and their extension? **Bill, x1003**
- What facility or location is the employee located in? **Headquarters**
- What is the type of problem that they are experiencing? **Clipping of voice**
- Using Operations Manager locate the IP phones, transport devices, and services having the problem.



## Collect Important Information

An employee of Company ABC is having problems with their their IP phone. The quality is poor, making it difficult to have a conversation using the phone. The employee decides to call the company Help Desk to see if they can locate the problem.

The Help Desk first collects important information from the caller, such as the employee's name, their phone extension, the type of problem they are having, and when the problem typically occurs (morning, afternoon, or after hours).

Once the information is collected, the Help Desk can use Operations Manager to locate the IP phones, transport devices, and services having the problem. In addition, diagnostic tests and be create to help troubleshoot the problem. So let's launch Operations Manager and follow along.

# Experiencing Phone Outages

## Locating IP Phone

**Service Level View**

Click here

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

Minimize / Expand bar

Use the Phone Search feature to easily locate the IP Phone

Drill down into more details from here

**Cisco Unified Operations Manager**  
Service Level View as of Tue 27-Feb-2007 14:44:14 PST

Showing: All IP Communications Devices > SJC-TME-HQCluster

Device

- All IP Communications Devices [default]
  - SJC-TME-HQCluster
    - 192.168.159.197
    - nmtg-hq-ccm-pri.cisco.com
    - Gateway and Gatekeepers
    - SJC-TME-BranchCluster
      - nmtg-br-ccm-pri.cisco.com
    - All Devices

Phone Search

Extension: 1003 GO

Search Results

- nmtg-hq-ccm-pri.cisco.com
- 192.168.159.205 [1003]
- Suspect Phones
  - 172.20.4.119

Tool Tips

Extension: 1003  
IP Address: 192.168.159.205  
MAC Address: 000c8b77b1  
Switch Name: 192.168.159.94

Device Name	Latest Event Time	Event Description	Alert Count
nmtg-hq-core-7200vwr.ci	10-Feb-2006 10:45:54	Interface	Critical 2
192.168.137.146	10-Feb-2006 08:19:07	Interface	Warning 0
nmtg-br-ccm-pri.cisco.cc	10-Feb-2006 07:58:18	Application	Informational 0
<b>Total Count:</b>			<b>2</b>

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Scenarios 3-80

## Locating IP Phone

An IP phone has a physical relationship with a switch and a logical relationship with a Cisco CallManager (CCM). So the Help Desk can run IP phone reports to provide a combined view of both of these relationships, making it easy for them to track and resolve IP phone related problems.

As illustrated above, locating the IP phone in question is easy from the Service Level View and by following these steps:

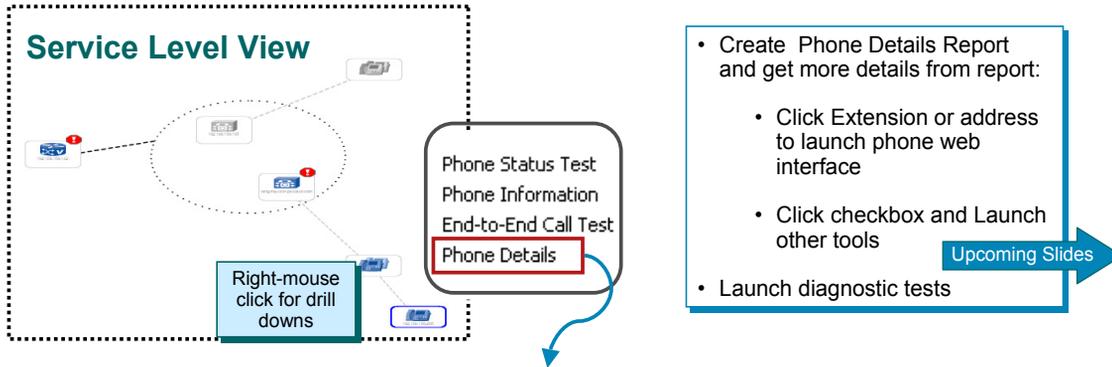
1. From the Service Level View, use the **Phone Search** feature in the lower left corner. (If you don't see this feature, it may be minimized. Click the Expand bar.)
2. In the Phone Search dialog, enter the Extension (I.e. 1003), IP or MAC address and click **Go**. The results are illustrated in the Search Results section.
3. Click on the phone in the Search Results section when found. The topology is updated, highlighting the phone in the topology (logical view).
4. Using the Tool Tips (place cursor over the phone), the connecting switch name is displayed.
5. Using the right-mouse drill down menus, more information on the phone and diagnostic tests are available. Let's look at these now.

Note(s):

- Illustrated above in the Phone Search window is a **Suspect Phone(s)** folder. This folder contains the IP phones that:
  - Have not registered with a Cisco CallManager.
  - Have made an unsuccessful attempt to register with a Cisco CallManager.

# Experiencing Phone Outages

## Gathering More Information



**Cisco Unified Operations Manager**  
Associated Phones for CCM : 192.168.137.4 as of Tue 27-Feb-2007 15:49:44 PST

Showing 1 - 3 of 3 records

	Extn.	User	IP Address	MAC Address	Model	Regd.	CCM/CME Address	Switch Address	Port
1.	<input checked="" type="checkbox"/>	1021 Auto 1021	192.168.137.11	00036b7fff1b1	7960	yes	192.168.137.4	192.168.137.24	Fa1/0/19
2.	<input type="checkbox"/>	1021 Auto 1021	192.168.137.8	00036be7b3d7	7960	yes	192.168.137.4	192.168.137.24	Fa1/0/21
3.	<input type="checkbox"/>				7960	yes	192.168.137.4	192.168.137.24	Fa1/0/20

Opens Web Interface to Phone

Next Slide

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Scenarios 3-81

## Gathering More Information

As illustrated, the Service Level View provides the Help Desk with reports and tools, making it easy for them to track and resolve IP phone problems. As illustrated above, diagnostic tests and reports can be quickly generated by right-mouse clicking on the IP phone in the Service Level View.

Above the Help Desk operator selects **Phone Details** from the drill down menu. An IP Phone report for just the selected IP phone is generated. The IP Phone report, illustrated above, provides:

- Access to the IP Phone's web interface by selecting either the phone's extension, IP address, or MAC address from the report.
- Information on the type of phone, protocol, and associated VLAN
- Information on the connecting switch
- Information on the registered Cisco CallManager
- Launch point for diagnostic tools

# Experiencing Phone Outages

## Access IP Phone Web Interface

Review IP Phone's details and network statistics; Look for errors or unusual metrics

Cisco Systems, Inc. IP Phone CP-7960G (SEP00137F7AA8AA)	
MAC Address	00137F7AA8AA
Host Name	SEP00137F7A
Phone DN	4103
App Load ID	P00307010200
Boot Load ID	PC0303010100
Version	7.1(2.0)
Expansion Module 1	
Expansion Module 2	
Hardware Revision	4.4
Serial Number	INM0910150L
Model Number	CP-7960G
Codec	ADLCodec
Amps	5V Amp
C3PO Revision	2
Message Waiting	NO

Cisco Systems, Inc. IP Phone CP-7960G (SEP00137F7AA8AA)	
Tx Excessive Collisions	0
Tx Frames	19075224
Tx Broadcasts	13558
Tx Multicasts	267585
Tx Collisions	0
Tx Deferred Abort	0
Rx Overruns	0
Rx Long/CRC	0
Rx Frames	64265867
Rx CRC Errors	0
Rx Bad Preamble	0
Rx Runt	0
Rx Multicasts	1337531
Rx Broadcasts	44160273
Rx Shorts	0

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Scenarios 3-82

## Access IP Phone Web Interface

When the Help Desk operator clicks on one of the following hyperlinks, it opens the IP phone web interface:

- Extension number
- IP address
- MAC address

Another window opens with information directly from the phone, including network configuration details, device, port, and Ethernet information for the specified IP phone. The Help Desk operator will review the information seen here including the logs and look for anything suspicious, such as: CRC errors, excessive collisions, and packet errors.

# Experiencing Phone Outages

## Schedule Diagnostic End-to-End Call Test

**Operations Manager Tutorial** | © 2007 Cisco Systems, Inc. All rights reserved. | Scenarios 3-83

	Extn.	User	IP Address	MAC Address	Model	Reqd.	CCM-CME Address	Switch Address	Port	
1.	<input checked="" type="checkbox"/>	1021	Auto 1021	192.168.137.11	00036b7fff1	7960	yes	192.168.137.4	192.168.137.24	Fa1/0/19
2.	<input type="checkbox"/>	1024						192.168.137.24	Fa1/0/21	
3.	<input type="checkbox"/>	1025							1/0/20	

**Selected phone is the destination**

**Source phone is a simulated phone previously defined in CallManager**

- **End-to-End Call** test will test whether the IP phone in question can complete a call with a synthetic phone defined in the CCM
- If problems occur, an alert is displayed in the **Alerts and Events** dashboard

## Schedule Diagnostic End-to-End Call Test

Remember that synthetic tests are used to measure the *availability* of voice applications. Synthetic tests verify whether the voice application can service requests from a user. In this scenario, the Help Desk operator will create a synthetic test to verify that the IP phone in question can register with its CCM and complete a call. The operator will run the test continuously to help detect the problem.

Follow these steps to define the synthetic test:

1. From the IP Phone Report, select the **checkbox** for the phone in question.
2. From the Launch button, select **Synthetic Test**.
3. The test type should be **End-to-End Call Test**. The Receipt fields will automatically be populated with the IP Phone selected in the IP Phone Report.
4. The Source Phone (Caller) will be a synthetic phone defined in a CCM. Use the same CCM or choose a different one from the device selection tree hierarchy. In this test, Susan chose the Branch Office CCM by selecting the CCM in the device selector and then clicking on the *triangles* next to the Caller >> Cisco CallManager / Express field.
5. The Caller MAC Address needs to be populated with a defined MAC address for a synthetic phone in the CCM. Remember, the MAC address for simulated phones must be between 00059a3b7700 and 00059a3b8aff.
6. Define the execution schedule and click **Create** when finished. A dialog message will display indicating if the test was created successfully.

# Experiencing Phone Outages

## Review End-to-End Call Test Results

Use the **Detailed Device View** to see the Synthetic Tests defined and their status

**Cisco Unified Operations Manager - Service Level View** as of Tue 27-Feb-2007 14:44:14 PST

**IP Communications Operations Manager - Detailed Device View for nmtg-br-ccm-pri.cisco.com**

Name	State	Status	Time Stamp	Error Message	Availability (%)	Associated Application	Failure (%)	Failure Threshold (%)	Interval (min)	Test Type
1. End2EndCall Test	Failed	Failed	Fri Feb 10 12:12:39 PST 2006	The test cannot run because the CPU has been busy. The test will run when the CPU becomes available.	100	CCM-nmtg-br-ccm-pri.cisco.com/1	0	50	1	End-to-End Call Test

**Looks like we may have a problem with the Branch Office CCM being overloaded!!**

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Scenarios 3-84

## Review End-to-End Call Test Results

The synthetic test uses a synthetic phone configured in CCM to measure the availability of voice applications by emulating the employee's actions. For example, a synthetic test places a call between clusters and then checks to see if the call is successful.

If the synthetic test fails, Operations Manager generates a critical event. Such events are displayed in the Alerts and Events display.

To see the status of the test defined in the CCM, follow these steps:

1. From the Service Level View, locate and select the CCM for where the synthetic test has been configured.
2. Right-mouse click on the CCM; select **Detailed Device View**.
3. From the Detailed Device View, use the hierarchy to locate and select the radio button for **Application>Synthetic Tests**.
4. Information regarding the End-to-End Call test is displayed. This information is very important, because *although the test has not failed, it could not be run because the CPU has been busy*. If the test can not run, then how can the CCM properly handle voice services. Let's look for alerts on the CCM and try to isolate this problem.

# Experiencing Phone Outages

## CCM Alert Details

Use the Alert Details to see the event detected by Operation Manager

No Free Virtual Memory!!

The screenshot shows the Cisco Unified Operations Manager interface. The top section is the 'Service Level View' for 'SJC-TME'. A tree view on the left shows the hierarchy of devices, with a red alert icon next to 'nmtg-br-ccm-pri.cisco.com'. A right-click context menu is open over this device, with 'Alert Details' selected. Below, the 'Alert Details' window is open, showing a table of events. The first event, 'InsufficientFreeVirtualMemory' (Event ID: 00004R5), is circled in blue. A red circle highlights the 'Event Details' window for this event, which shows a table of metrics. A red oval highlights the 'VirtualMemoryUsed' value of 1025 MB in the 'Event Details' table.

**Alert Details**  
as of Tue 27-Feb-2007 16:08:26 PST

Device Name: nmtg-br-ccm-pri.cisco.com Device Type: MediaServer  
Status: Active Alert ID: 00000XH Alert Age: 15 hr 57 min Latest Event Time: 16:08:26 PST

#	Event ID	Description	Component
1.	00004R5	InsufficientFreeVirtualMemory	MEM-nmtg-br-ccm-pri.cisco.com/5
2.	00004R3	ServiceDown	VS-nmtg-br-ccm-pri.cisco.com/8
3.	00004R2	ServiceDown	VS-nmtg-br-ccm-pri.cisco.com/7
4.	00004R1	ServiceDown	YS-nmtg-br-ccm-pri.cisco.com/13

**Event Details**  
as of Tue 27-Feb-2007 16:10:26 PST

Name	Value
Event_Description	InsufficientFreeVirtualMemory
Component	MEM-nmtg-br-ccm-pri.cisco.com/5
VirtualMemoryUsed	1025 MB
FreeVirtualMemoryInPercentage	0 %
VirtualMemoryTotalSize	1026 MB
FreeVirtualMemoryThreshold	15
CurrentVirtualMemoryUsed	1025 MB
CurrentFreeVirtualMemoryInPercentage	0 %
CurrentFreeVirtualMemoryThreshold	15
CurrentVirtualMemoryTotalSize	1026 MB

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## CCM Alert Details

The Service Level View can also be used to view alerts and associated events on the Unified Communications devices. To view alerts for the CCM, follow these steps:

1. From the Service Level View, locate and select the CCM for where the synthetic test has been configured.
2. Notice that there is a critical alert icon on the CCM. Right-mouse click on the CCM; select **Alert Details**.
3. The Alert Details report lists the one or more events detected on the CCM. The Service Down events were reviewed in a Scenario earlier and determined that these services did not need to be running. However, the **Insufficient Virtual Memory** event is critical and will cause increased page faults and thrashing and lead to lower performance.

In this case, the event has caused the synthetic test to not run and will most likely cause services provided by the Branch Office CCM to fail as well.

# Experiencing Phone Outages

## More Alerts and Events

**CISCO SYSTEMS** Cisco Unified Operations Manager  
Service Level View as of Tue 27-Feb-2007 14:44:14 PST

Showing: All IP Communications Devices

Device: [ ] GO

- All IP Communications Devices [default]
- SJC-TME-HQCluster
- SJC-TME-BranchCluster
- All Devices

Phone Search [ ] Click to View All Phones

Extension [ ] GO

Search Results [ ]

Alerts also detected on Headquarter Core Router  
(This is where the Node-to-Node IP SLA Jitter test is running!)

More [ ] Most Recent Alerts [ ] Click to View All Alerts [ ] Next Slide [ ]

!	Device Type	Device Name	Latest Event Time	Event Description
!	MediaServer	austincm3.cisco.com	27-Feb-2007 16:10:20	Application
!	Router	nmtg-hq-wan-3725.cisco.com	27-Feb-2007 15:36:33	Utilization
!	MediaServer	nmtg-sj-ccmr-prn.cisco.com	27-Feb-2007 13:54:24	Application

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Scenarios 3-86

## More Alerts and Events

So far from the reports seen, we have noticed one probable cause – the Branch Office CallManager lacks available virtual memory.

But look! From the Service Level View we can see that there's also alerts coming from the core router at the Headquarters. And since the user is located at the headquarters site, there may also be problems within connections between the company's headquarters and the branch office.

Let's drill down into this event for more information. Select **"Click to View All Alerts"** from the Service Level View.

# Experiencing Phone Outages

## More Alerts and Events, continue ...

**CISCO SYSTEMS**

### Cisco Unified Operations Manager

Alerts and Events as of Tue 27-Feb-2007 16:13:29 PST

Showing: All Alerts, 11 records

#	!	ID	Device Type	Device Name	Alert Age	Latest Event Time	Latest Event Description
1.	!	00000XD	IPSLA	nmtg-hq-wan-3725.cisco.com	18 hr 40 min	10-Feb-2006 13:01:55 ♦♦	Interface
2.	!	00000XE	MediaServer	nmtg-hq-ccm-pri.cisco.com	18 hr 37 min	10-Feb-2006 11:30:15	Application
3.	!	00000X9	Probe	192.168.137.146	18 hr 41 min	10-Feb-2006 08:19:07	Interface
4.	!	00000XH	MediaServer	nmtg-br-ccm-pri.cisco.com	16 hr 52 min	10-Feb-2006 07:58:18	Application
5.	!	00000W3	Unidentified trap	Unidentified trap	95 hr 20 min	09-Feb-2006 23:57:14	Utilization
6.	!	00000XB	IPSLA	192.168.159.130	18 hr 40 min	09-Feb-2006 20:48:01	Interface
7.	!	00000XG	Router	192.168.159.132	16 hr 53 min	09-Feb-2006 20:33:22	Utilization
8.	!	00000XC	IPSLA	192.168.137.141	18 hr 40 min	09-Feb-2006 18:46:15	Reachability
9.	!	00000X8	PhoneAccessSwitch	nmtg-hq-core-6509nbs.cisco.com	18 hr 41 min	09-Feb-2006 18:45:59	Reachability

Views: All Alerts, Suspended Devices

Alerts and Events Dashboard icon

This report can also be launched from clicking the Alerts and Events Dashboard icon

Get more details on the events causing the alert by clicking on the **Alert ID**

Next Slide

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Scenarios 3-87

## More Alerts and Events, continue ...

The Alerts and Events View is displayed. This view is also available by clicking on the **Alerts and Events Dashboard** icon from the Operations Manager home page.

Sure enough! There's an alert from the IP SLA feature on the router.

Remember Susan's proactive planning? She's on top of the game! In the previous scenario, she took the proactive steps to utilize the IP SLA feature in the IOS devices to setup a Node-to-Node test in Operations Manager (test type Data Jitter). The test is continuously simulating voice traffic from the headquarters to a remote site and measuring the response time of the traffic. Susan developed this test because she knew site-to-site communications is being deployed across the IP network and continuous monitoring of its quality is crucial to business operations.

Let's look at the alert by clicking on the alert ID.

# Experiencing Phone Outages

## More Alerts and Events, continue ...

**CISCO SYSTEMS** Alert Details  
as of Tue 27-Feb-2007 16:08:26 PST

**Device Name:** nmtg-hq-wan-3725.cisco.com **Device Type:** IPSLA  
**Status:** Active **Alert ID:** 00000XD **Alert Age:** 18 hr 55 min **Latest Event Time:** 10-Feb-2006 13:01:55

Events: (3)

#	Event ID	Description	Component	Time	Status	Tools	Impact
1.	00004SJ	Quality_DroppedBelowThreshold	NodeToNode-Test: HQJitter	27-Feb-2007 15:36:33	Active	-- Select --	None
2.	00004SI	NodeToNodeTestFailed	NodeToNode-Test: HQJitter	10-Feb-2006 12:51:05	Active	-- Select --	None
3.	00004QF	Unresponsive				-- Select --	None

**CISCO SYSTEMS** Event Details  
as of Tue 27-Feb-2007 16:10:26 PST

Event ID: 00004SJ

Name	Value
Event_Description	Quality_DroppedBelowThreshold
Component	NodeToNode-Test: HQJitter
Threshold	3
MetricValue	0

Acknowledge Clear Close

The connection between the headquarters and branch office is really bad!

This could be a result of latency, packet loss, or jitter.

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Scenarios 3-88

## More Alerts and Events, continue ...

Drilling down into the alert, Susan can see the quality of the test calls is horrible! The operator can now begin troubleshooting with a number of tools within Operations Manager. Let's start with these:

- Physical connectivity details between the test points
- Path Analysis

# Experiencing Phone Outages

## Connectivity Details / Path Analysis

The screenshot displays three main components of the Cisco Unified Operations Manager interface:

- Service Level View:** Shows a tree of devices. A right-click context menu is open over a device, with 'Connectivity Details' highlighted. A callout box says 'Drill down into Connectivity Details'.
- Path Analysis Tool:** Shows source and destination IP addresses: 192.168.159.131 (Headquarters) and 192.168.137.130 (Branch Office). Below is a table of path information.
- Physical Connectivity:** A network map showing connections between 'Headquarters' and 'Branch Office' nodes. A callout box says 'Isolate problems along the physical path'.

Hop Id	Device IP Address	Device Type	Status	Latency from Source	Tools
1. 1	192.168.159.129	[Router Icon]	[Down Arrow]	4 ms	[Select]
2. 2	192.168.159.78	[Router Icon]	[Red Exclamation Mark]	4 ms	[Select]
3. 3	192.168.137.74	[Router Icon]	[Down Arrow]	6 ms	[Select]
4. 4	192.168.137.130	[Router Icon]	[Down Arrow]	4 ms	[Select]

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Scenarios 3-89

## Connectivity Details / Path Analysis

As seen in most of these tasks, the Service Level View provides an intuitive approach to obtaining more information and launching other tools.

The physical connections to a device and its connections several hops away can be displayed using the **Connectivity Details** drill down. Simply right-mouse click on a device and select it from the pop-up menu.

From here, Susan could launch a **Path Analysis** from the headquarters to the branch office. The Path Analysis tool provides hop-by-hop latency information for all the Layer 3 devices. It uses the ping path echo operation of IP SLA; thus, only devices that are IP SLA capable will display this menu item.

Susan can select an IP SLA-enabled source and/or a destination device from either the view pane or the map display pane and launch the tool. This will help Susan isolate the problem!

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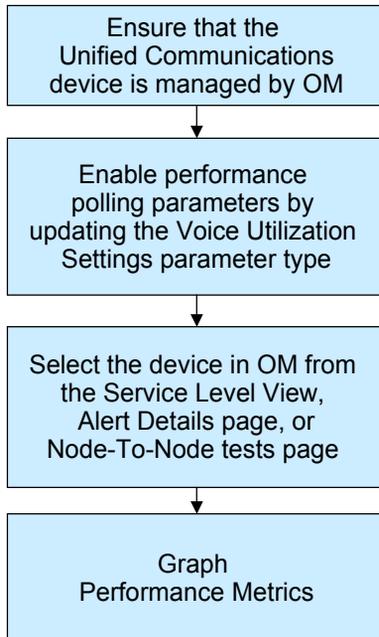


# Performance Monitoring

- Getting Started
- Preparing OM for Initial Use
- Normal Operational Status
- Service Availability Testing
- Node-to-Node (IP SLA) Testing
- Experiencing Phone Outages
- **Performance Monitoring**



## Scenario 9: Performance Monitoring Outline



### Performance Monitoring

In the first three scenarios, the user prepared the devices to be managed and configured Operations Manager. The system at that point was managing the Unified Communications devices and ready for day-to-day network management operations (reports and alert monitoring).

Since Operations Manager is continuously polling the managed devices in the OM inventory for various statistics and comparing them to defined thresholds, Susan Jones, the lead network engineer at Company ABC, is interested in reporting / graphing the metrics polled to evaluate the performance of the device or its interfaces for port or CPU utilization.

Operations Manager allows the network administrator to select and examine changes in network performance metrics. Susan can select, display, and chart network performance data in real time. The performance graphs are accessed through the Service Level View, Alert Details page, and Node-To-Node Tests page.

# Performance Monitoring

## Verify Device is Monitored by OM

**Device Management** | Device Groups | Device Credentials

**Modify/Delete Devices**

**Device Selector**

- All Devices
- All Monitored Devices
  - 192.168.137.24
  - austincm3.cisco.com
  - nmtg-branch-2620.cisco.com
  - nmtg-hq-wan-3725.cisco.com
  - nmtg-remote-2811.cisco.com
  - nmtg-sj-ccm-pri.cisco.c
  - nmtg-sj-ccm-sec.cisco.com

**Device Information**

Name: nmtg-sj-ccm-pri.cisco.com

Summary:

- IP Address = 192.168.137.3
- DNS Name = nmtg-sj-ccm-pri.cisco.com
- Device Status = **Monitored**
- Device Type = Voice and Telephony
- Aliases = N/A
- Containments = N/A
- OM Processing = Active
- Ethernet Phone Port = Not Specified
- Time Last Discovered = Sat 24-Feb-2007 02:07:51 PST
- Import Time Stamp = Mon 12-Feb-2007 23:36:16 PST

\*\*\* Data Collector Status Information \*\*\*

- Error Code = N/A
- Error Message = N/A

Buttons: View, Edit, Rediscover, Suspend, Resume, Delete

Callout Box:

- To monitor the performance statistics using OM, ensure that the device that you want to monitor has the status "Monitored"
- Use either **Modify / Delete** task or click **device count** to determine status

## Verify Device is Monitored by OM

In order for Susan to use OM for Performance Monitoring, the device must be managed by OM; which means that it must be in the Operations Manager's inventory by importing it from the DCR. Susan can verify that it has been imported by using the **Modify/Delete Devices** page and by following these steps below:

1. From the OM home page, select **Devices > Device Management**.
2. As seen previously, the user could click on the device count for the devices in the Monitored status. Or, the user could click on the task, **Modify/Delete Devices**. The Modify/Delete Devices page opens, as illustrated above.
3. Susan wants to monitor the CCMs located at both the company's headquarters and branch office. In the device selector, she locates the device(s) that she is interested in.
4. Susan clicks on the device. The device information appears in the right pane, as illustrated above. Verify that Device Status is **Monitored**. A Monitored state on the device indicates that it was imported successfully and being managed by OM.
5. If the device is not in the Monitored state, refer to the on-line Help "Troubleshooting Device Import and Inventory Collection". Only the devices in the All Partially Monitored Devices group and the All Unreachable Devices group were not imported fully into Operations Manager.
6. Click **View** to get more information on the device, such as when the last Inventory Collection occurred.

# Performance Monitoring

## Enable Voice Utilization Polling Settings

The screenshot shows the Cisco Unified Operations Manager interface. The title bar reads "Cisco Unified Operations Manager Service Level View as of Tue 27-Feb-2007 16:35:37 PST". The main content area is titled "Showing: All IP Communications Devices > HQCluster". On the left, a tree view shows the hierarchy: "All IP Communications Devices [default]" > "HQCluster". A call center monitor (CCM) icon is highlighted in the tree. A callout box points to the CCM icon with the text "Right mouse click on CCM". A context menu is open over the CCM icon, with "Polling Parameters" highlighted in red. A blue arrow points from the text "next slide" to the "Polling Parameters" option. Another callout box points to the "Polling Parameters" option with the text "next slide". A third callout box points to the "Polling Parameters" option with the text "Right mouse click on CCM".

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## Enable Voice Utilization Polling Settings

Operations Manager uses the statistics gathered during Voice Utilization polling for charting network performance. The Voice Utilization settings control polling for performance and capacity data and is disabled by default. To collect the utilization statistics desired, *enable the Voice Utilization polling settings* for the device group that the device belongs to.

If Susan knows which Device Group that the CCM belongs to, she could enable the utilization polling settings by following this step:

1. Select **Administration > Polling and Thresholds**. Select **Polling Parameters** from the TOC.

But to use this method, you now need to select the appropriate device group for the CCM. *Remember, the device may belong to more than one device group because of its capabilities and you need to select the "overriding" device group.*

Susan is not sure of the "overriding" device group for the CCM. Therefore, Susan uses an easier way! The following steps (illustrated above) make sure that the correct device group is being edited to enable Voice Utilization polling:

1. From the Service Level View, right-mouse click on the device. Select **Polling Parameters**.
2. The Polling Parameters:Edit dialog is displayed and the correct device group System Defined Group called "*Cisco IP Telephony Applications> CallManagers*" is selected.

(If Susan had to guess, she would have guessed wrong and selected the "78xx Media Servers", which is the device group for the CCM, but not the overriding device group.)

# Performance Monitoring

## Enable Voice Utilization Polling Settings, continue ...

**Polling Parameters: Edit**

Group Name: /JOM@IPCOM-DEM03/System Defined Groups/Cisco IP Telephony Applications/CallManagers

Parameter Type: **Voice Utilization Settings**

Parameter	Interval (sec)	New Interval (sec)	Timeout (msec)	New Timeout (msec)	Retry	New Retry	Defaults	Polling Enabled
Reachability Settings:	240	240	700	700	3	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Connector Port and Interface Settings:	240	240	700	700	3	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Access Port Settings:	1200	1200	700	700	3	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Polling Parameters: Edit**

Group Name: /JOM@IPCOM-DEM03/System Defined Groups/Cisco IP Telephony Applications/CallManagers

Parameter Type: **Voice Utilization Settings**

Parameter	Interval (sec)	New Interval (sec)	Timeout (msec)	New Timeout (msec)	Retry	New Retry	Defaults	Polling Enabled
Cisco CallManager and Registered MGCP Gateway Utilization:	240	240	NA	NA	NA	NA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Buttons: Save, **Apply**, Cancel, Help

• The settings must be Applied in order for them to take affect

• Tip: Click Save if there are MORE settings to change, then click **Apply Changes** from the TOC when done

Operations Manager Tutorial

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Scenarios 3-95

## Enable Voice Utilization Polling Settings, continue ...

Susan will edit the utilization polling settings by continuing with these steps:

- Using the Edit:Polling Parameters dialog, change the Parameter Type to **Voice Utilization Settings**, as illustrated above.

Note: This changes the settings for the entire device group, not just the device of interest.

- Enable polling by checking the checkbox, **Polling Enabled**
- Click Save if making more changes to the settings; otherwise, click **Apply** to save the settings, close the Polling Parameters: Edit dialog box, and apply changes to the system. When a confirmation dialog box appears, click **Yes**.

Review the other settings as well.

- Data Settings--Control polling for devices and those ports and interfaces that are not voice-enabled.*
- Voice Health Settings--Control polling for voice-enabled devices, ports, and interfaces.*
- Voice Utilization Settings--Control polling for performance and capacity data; disabled by default.*

Additional Note(s):

- When you click Apply, Operations Manager performs the following tasks:*
  - *Recalculates group membership, based on group priority.*
  - *Uses the new polling and threshold settings to gather information from the devices.*
- You must also apply changes after resuming a device, so that Operations Manager will begin polling the device depending on the appropriate settings.*
- You can apply changes by selecting **Administration > Polling and Thresholds > Apply Changes** in the TOC menu.*
- When you click Save, Operations Manager sets the polling and threshold settings in the selected group. Click Save if you plan to make more changes shortly, it would be more efficient since applying changes is a CPU-intensive event that might take between one and ten minutes to complete.*

# Performance Monitoring

## Graph Performance Statistics

The screenshot displays the Cisco Unified Operations Manager interface. At the top, it says "Cisco Unified Operations Manager Service Level View as of Tue 27-Feb-2007 16:41:47 PST". On the left, a "Device" tree shows a hierarchy of "All IP Communications Devices" including clusters like "AustinCCM40Cluster", "AustinCluster", "HQCluster", and "HGCCM41Cluster1". A specific device, "nmtg-sj-ccm-pri.cisco.com", is highlighted. The main area shows a network diagram with nodes and connections. A context menu is open over the highlighted device, listing options: "Associated Phones", "Performance" (highlighted with a blue bar and an arrow pointing right with the text "See next slide"), "Suspend Device", "Polling Parameters", "Threshold Parameters", "Delete Device", "Group Devices", "End-to-End Call Test", "Dial Tone Test", and "Phone Registration Test".

The device can be selected from the Service Level View, Alert Details page, or Node-To-Node tests page

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## Graph Performance Statistics

When graphing performance metrics for a device, follow these steps:

1. As illustrated above, select the device for which you want to graph performance metrics. In this case, Susan right-mouse clicked on the CCM of interest. You can select, display, and chart network performance data in real time. The performance graphs are accessed through the Service Level View, Alert Details page, and Node-To-Node Tests page.
2. Select **Performance**. A metrics dialog box appears, as illustrated on the next page.

# Performance Monitoring

## Graph Performance Statistics, continue ...

Select Performance Metric(s) to Graph (up to 4)

CPU utilization for the CCM

## Graph Performance Statistics, continue ...

From the list of metrics to graph, follow these steps:

1. Select the desired metric(s), and click **View Graph**. If selecting multiple metrics (up to four), they must be of the same units.
2. Review the graph results. It displays the performance metrics as a graph or in tabular format. To choose either a graph or tabular display, choose the desired tab located at the top right of the page, under the window tools area. The information in a graph can be viewed as a snapshot in time or it can be refreshed at regular intervals by selecting a time interval or *Real Time* from the Time Interval pull-down menu located above the graph.

The types of utilization statistics collected and saved vary per device type. The OM on-line help on Performance Graphing helps you to understand the types of statistics that are available. For example, on a CCM, Susan can graph the following statistics:

- CPU Utilization
- Active Calls
- Port Utilization
- Various CCM Resource Utilization: MOH multicast and Unicast, MTP resource, Transcoder, hardware conference, software conference, percentage conference active, percentage conference streams active, and location bandwidth available

The data files for the performance metrics are located on the server, in the <OM installed directory>\data\gsu\\_#GSUdata#\_ directory. You will need access to the server directory, where Operations Manager is installed to access these files. The filenames are created using the device name and the date. These files are kept for 72 hours, after which they are purged.



**CISCO**

Thank You!

**Continue on to Chapter 4 to learn about some of the system administrative tasks not yet discussed.**

**Cisco Systems**



# Cisco Unified Operations Manager

## System Administration

### Chapter 4



# Chapter 4 Outline

- Requirements
  - Server
  - Client
- Installation Guidelines
  - Licensing
  - Shared DCR
- User Security Administration
- Periodic Maintenance
- Helpful Troubleshooting Tips



## Chapter 4 Outline

This chapter starts out by covering some basic requirements for both the Operations Manager (OM) server and the client used to access the server. Following that are sections that briefly covers some installation guidelines, periodic maintenance tasks, and some helpful troubleshooting tips.

For detailed installation steps, refer to the Installation and Setup Guide for Operations Manager. Links to these reference guides can be found in Chapter 5.



# Requirements

- **Requirements**
- Installation Guidelines
- User Security Administration
- Periodic Maintenance
- Helpful Troubleshooting Tips



# Requirements

## OM Server Sizing

System Parameter	Capacity per Deployment Size		
	Small–Medium	Medium–Large	Large–Very Large
Monitored Phones	5,000	10,000	30,000
Monitored Voice Devices	300	1,000	2,000
Monitored CCM Clusters	10	15	30
Monitored CME Routers	100	250	500
Monitored SSRT Routers	10	100	500
Concurrent Synthetic Tests	25	100	250
Concurrent Node-to-Node (IP-SLA/SAA) Tests	25	100	250
Phone Reachability Tests	50	500	1000
Concurrent Client (Browser) Logins	5	5	5

## Operations Manager Server Sizing

The actual requirements for a server depends on the number of objects to be managed by Operations Manager and the number of synthetic tests to be configured. This chart provides guidelines for small to medium, medium to large, and large to very large deployments. The size of the deployment will determine the requirement for the server as detailed on the next page.

# Requirements

## Standalone OM Server

Parameter	Deployment Size		
	Small–Medium	Medium–Large	Large–Very Large
Processor	<ul style="list-style-type: none"> <li>Intel Pentium or Xeon processor &gt; 2Ghz</li> <li>AMD Opteron processor &gt;2 Ghz</li> </ul>	<ul style="list-style-type: none"> <li>Dual Intel Pentium or Xeon processor &gt; 3Ghz</li> <li>Dual AMD Opteron processor &gt;3 Ghz</li> </ul>	<ul style="list-style-type: none"> <li>Dual Intel Pentium or Xeon processor &gt; 3Ghz</li> <li>Dual AMD Opteron processor &gt;3 Ghz</li> </ul>
Memory	2 GB	4 GB	4 GB
Swap	4 GB	8 GB	8 GB
Disk Space (NTFS Format)	72 GB	72 GB	72 GB
Operating System	Windows 2003 Server SPK1	Windows 2003 Server SPK1	Windows 2003 Server SPK1

- Additional applications (i.e. Service Monitor) requires additional server resources (upcoming slide)
- Windows Terminal Services is supported in remote administration mode only
- 16 MB of space required in temp directory

## Standalone OM Server Requirements

The chart above details the sizing requirements for the Operations Manager server depending on the size of the deployment. The only real difference being in the CPU horse power and the amount of memory.

**Note:** It is always a good idea to check the latest release notes for up-to-date information regarding system requirements.

# Requirements

## Co-resident OM-SM Server

Parameter	Deployment Size	
	Up to 1,000 IP Phones	Up to 5,000 IP Phones
Processor	<ul style="list-style-type: none"> <li>Intel Pentium or Xeon processor &gt; 2Ghz</li> <li>AMD Opteron processor &gt;2 Ghz</li> </ul>	<ul style="list-style-type: none"> <li>Dual Intel Pentium or Xeon processor &gt; 3Ghz</li> <li>Dual AMD Opteron processor &gt;3 Ghz</li> </ul>
Memory	4 GB	4 GB
Swap	8 GB	8 GB
Disk Space (NTFS Format)	72 GB	72 GB
Operating System	Windows 2003 Server SPK1	Windows 2003 Server SPK1

- More than 5,000 IP Phones requires standalone servers for OM and SM
- Windows Terminal Services is supported in remote administration mode only
- 16 MB of space required in temp directory

## Co-Resident OM-SM Server

In some situations, you may want to install Operations Manager and Service Monitor (OM-SM) on the same server. For deployments of less than 5,000 IP phones, Operations Manager and Service Monitor can reside on the same platform.

The chart above details the sizing requirements for the Operations Manager/Service Monitor server depending on the size of the deployment. The only real difference in requirements is in the recommended CPU and the amount of memory (RAM).

Note(s):

- It is always a good idea to check the latest release notes for up-to-date information regarding system requirements.
- Windows Terminal Services is supported in remote administration mode only
- 16 MB of space required in temp directory

# Requirements

## Client Platform

Client Requirements (minimum)	
Processor	Pentium IV > 1Ghz
Memory	1 GB
Swap	2 GB
Operating System	<ul style="list-style-type: none"><li>Windows XP Home or Professional with SPK2</li><li>Windows Server 2003, SPK1, Standard or Enterprise without terminal services</li></ul>
Additional Software	<ul style="list-style-type: none"><li>Microsoft Internet Explorer 6.0.2600.0000, IE 6.0.2800.1106, or IE 6.0 (6.0.3790.0, which ships with Windows 2003 Server)</li><li>Adobe Macromedia Flash Player 8 or 9</li></ul>

## Client Requirements

Access to an Operations Manager server is achieved using a standard web browser. Operations Manager has been tested and certified only on PC compatible systems running either Windows XP or Windows 2003, and using Microsoft Internet Explorer (6.0.28 or 6.0.37).

**Note:** It is always a good idea to check the latest Operations Manager release notes for up-to-date information regarding system requirements.

**Note:** Clients not conforming to the above requirements may also work but have not been tested and certified by Cisco and therefore will not be supported should problems arise.

# Requirements

## Client Web Browser Configuration

- ✓ Enable Java and Java Script
- ✓ Set browser cache to at least 6 MB
- ✓ Configure your browser to accept all cookies
- ✓ Configure your browser to compare each page with its cached version every time it loads a page
- ✓ Change the default timeout to 20 minute
- ✓ Enable style sheets
- ✓ Change the default font to sans-serif for improved readability
- ✓ Disable any pop up blocker utility installed on client system
- ✓ Add server as a Trusted Internet site for improved screen size

## Web Browser Configuration

As discussed in the Client Requirements, Internet Explorer is the only supported web browser to access Operations Manager. The Install and Setup Guide describes the exact steps for configuring each of the above configuration items for each browser type. (Refer to Chapter 5 for a link to the Install Guide.)

Using the *Tools>Internet Options> Security* dialog of Internet Explorer, add the Operations Manager server as a Trusted Internet site. In doing so, the status bar on the bottom of the browser will be removed resulting in a better screen size for the OM dashboards and dialogs.

If you have browser problems after configuring your browser, increase your disk cache settings.

After the web browser is installed on the client system, there are no additional disk space requirements.

However, because the browser uses the local disk to store cached information, ensure that you have enough disk space for the amount of cached information you want to store.



# Installation Guidelines

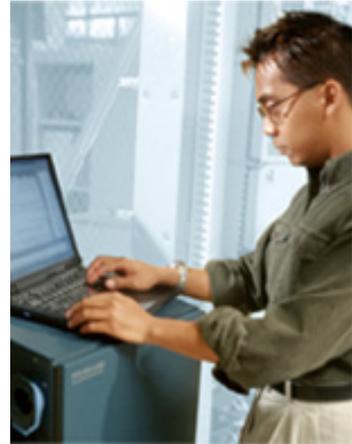
- Requirements
- **Installation Guidelines**
- User Security Administration
- Periodic Maintenance
- Helpful Troubleshooting Tips



# Installation Guidelines

## General

- Use local Administrator account (not cloned account)
- Install on a dedicated platform with static IP Address
- Do not install on:
  - A Primary or Backup Domain Controller
  - A FAT file system
  - An Advanced Server with terminal services enabled in application server mode
  - A system with Internet Information Services (IIS) enabled
  - A system that does not have name lookup
- Verify server requirements and Required and Recommended Service Packs or Patches for operating system are installed (server and client updates exist)



## Installation Requirements

Installation of Operations Manager should be performed according to the steps detailed in the Installation and Setup Guide. (A link to this guide can be found in Chapter 5.)

- Operations Manager should be installed using the local Administrator (not a cloned account) user account.
- If required server patches are missing, the install script prompts whether to continue installation or not. Note that there are required and recommended service packs or patches for clients as well as server. Remember that client patches are not necessary if the system is used only as a Server.
- During new installation and upgrade, the user needs to enter the System Identity Account Password. System Identity account password has to be the same for all the servers in a multi-server setup.
- The installation script will check for host name resolution. If the host name lookup does not exist, the installation will abort.
- If DHCP is enabled the user is also issued a warning because when the IP address changes, the application will no longer work.
- If IIS (Microsoft's Internet Information Services) is enabled, the installation will abort due to a port conflict between Web Server and IIS. If IIS is disabled, the installation will issue a warning message noting the conflict between the Web Server and IIS.

# Installation Guidelines

## Continue ...

- Verify TCP, UCP ports are available for use
- Refer to Installation and Setup Guide for Operations Manager for installation procedure
  - License file required
  - Refer to next section for more information on managing licenses



## Installation Requirements

Refer to the previous section's notes for the ports used by Operations Manager and ensure they are not in use on the server.

And finally, Operations Manager requires a license file to be installed to work. The licensing mechanism is discussed next.

## Operations Manager TCP and UDP Ports

Port Number / Type	Usage
162 / udp	Default port number used by Operations Manager for receiving traps
1741/tcp	Used for HTTP server
9002 / tcp	Used by the Broker to listen to both the IP telephony server and the device fault server
9009 / tcp	Default port number used by the IP telephony server for receiving traps from the device fault server
40000–41000 / tcp	Used by Common Transport Mechanism for internal application messaging
42344 / tcp	Used by Synthetic Testing web service
42350–42353 / tcp	Used by messaging software
43441–43459	Used as database ports:  Operations Manager uses the following ports: <ul style="list-style-type: none"><li>• 43445--Used by Alert History database engine</li><li>• 43446--Used by inventory service database engine</li><li>• 43447--Used by event processing database engine</li><li>• 43449--Used by IP Phone Information Facility database engine</li><li>• 43459--Used by Service Monitor database engine</li></ul>

# Installation Guidelines

## CUOM v2.0 Licensing

- Installation ensures a registered and licensed copy of the product is being installed
  - Feature-based
    - Standard Edition
    - Premium Edition
  - Scale-based
    - 1000, 2000, 5000, 10000, 20000, 30000 phones
    - Up to 30,000 IP Phones per Operations Manager
- Following license information is shipped with product:
  - Product Identification Number (PIN) – indicates type of install
  - Evaluation Installation – Valid for 90 days; after message is displayed
  - Product Authorization Key (PAK) – Use to register product at Cisco.com, a license file is returned.
- Install will prompt for the location of the license file returned from the registration process; If upgrading from evaluation license, enter location of license file at **Common Services > Server > Admin > Licensing**

## Licensing

Operations Manager requires a license to operate. If a license is not installed, Operations Manager operates in Evaluation mode for 90 days. If the product has not been licensed after the 90 day evaluation period, the product will continue to work but the user will not have access to key tasks within the product. The user is reminded at each login of the days remaining in the evaluation period.

To obtain a license, the user must register Operations Manager at Cisco.com. Operations Manager is shipped with a Product Identification Number (PIN) indicating the type of install (evaluation, fresh, or upgrade) and a Product Authorization Key (PAK) which is used to register the product at Cisco.com.

The installation will ask you for the location of the license file. To obtain the license file, go to either:

**<http://www.cisco.com/go/license>** (registered users) or

**<http://www.cisco.com/go/license/public>** (non-registered users)

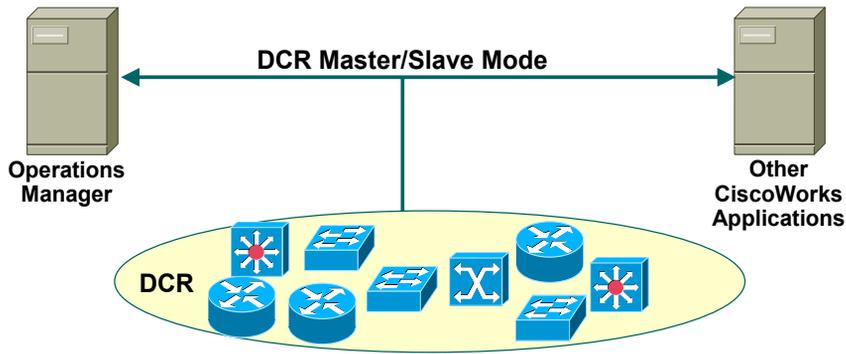
use the PAK to register the product and download the license file to the server. (Users who are not registered users of Cisco.com will be mailed the license file.)

To apply the license after installation (upgrade), secure the license file and go to *Common Services > Server > Admin > Licensing* and enter the location of the license file.

# Installation Guidelines

## Sharing Devices with other CiscoWorks Applications

Share devices between servers by creating a common DCR on both servers



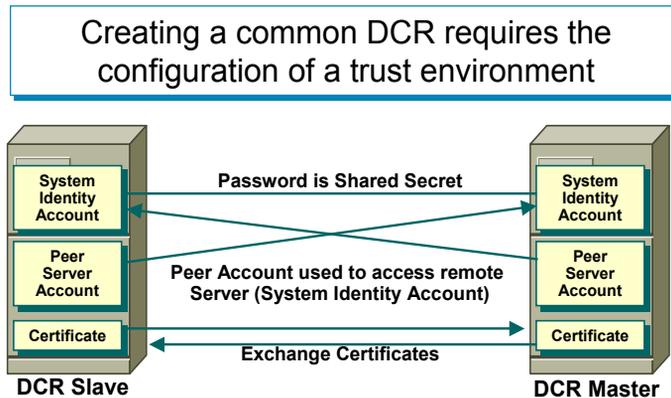
## Sharing Devices with other CiscoWorks Applications

Operations Manager requires the services provided by the underlying software, Common Services. One task of Common Services is to keep the Device and Credentials Repository (DCR). Because all CiscoWorks applications use Common Services, it is possible to configure Common Services to share devices in their DCR with other server's DCRs. This effectively creates a common set of devices and credentials between all CiscoWorks servers and applications, thus minimizing device maintenance on separate platforms.

If this feature is to be used, it is suggested that administrators first configure Operations Manager device selection to be manual (From the DCR, select specific devices to be managed) to avoid over population of Operations Manager with devices with no IPC features.

# Installation Guidelines

## Trust Environment



Trust Environment also enables:

- Single Sign-On (SSO) – Sign on once for access to all servers in domain
- Import remote applications to local homepage
- Sharing of group information between servers

*\* See Common Services Tutorial for more details*

## Trust Environment

To share devices among other servers using Common Services, a Trust Environment between servers must be established. This requires the swapping of certificates and the creation of common System Identity and Peer Server Accounts. Details for creating the Trust Environment and sharing DCRs can be found in the Common Services Tutorial.

Once the Trust Environment is established, the user can realize other benefits besides the sharing of all devices via common DCRs.

The first multi-server feature is Single-Sign-On (SSO). This allows for a user to authenticate once and then browse and use any server in the management domain without having to authenticate with every server. SSO mode requires one server to be the authentication master. Since all other servers must now securely access this server to process logins, trust must be setup between the servers.

Another multi-server feature is to have the homepage of one server registered the applications on all other servers to facilitate browsing and task execution.

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# User Security Administration

- Requirements
- Installation Guidelines
- **User Security Administration**
- Periodic Maintenance
- Helpful Troubleshooting Tips



# User Security Administration

## Login Modes

	Non ACS		ACS
	Common Services	External Module	
<b>Authentication</b>	Common Services	External Module	<ul style="list-style-type: none"> <li>• ACS</li> <li>• External database integrated with ACS</li> </ul>
<b>Authorization</b>	Common Services	Common Services	ACS
<b>User Roles</b>	5 pre-defined static roles	5 pre-defined static roles	<ul style="list-style-type: none"> <li>• <b>5 pre-defined roles per application which can be modified</b></li> <li>• <b>Can create new user roles per application</b></li> </ul>
<b>User Assignment</b>	<ul style="list-style-type: none"> <li>• One or more per user</li> <li>• Same for all applications</li> </ul>	<ul style="list-style-type: none"> <li>• One or more per user</li> <li>• Same for all applications</li> </ul>	<ul style="list-style-type: none"> <li>• <b>One per application per user or user group</b></li> <li>• <b>One per Network Device Group per user or user group</b></li> </ul>

**ACS adds increased security and flexibility!**

## Login Mode

One of the services provided by Common Services is security. Common Services supports two methods for AAA services: Non-ACS and ACS. In the non-ACS mode, several mechanisms are available for user authentication. By default, Common Services performs the authentication check using user accounts added to its local database. The login module can also be set to a number of different external mechanisms (listed in the figure above) to perform the authentication service. Regardless of the mechanism used to perform the authentication service, authorization, or task permission, is always handled by the local accounts in Common Services in the non-ACS mode.

The ACS mode differs from the non-ACS mode in that ACS not only authenticates the user, but also provides the authorization; the local Common Services accounts are not used in this mode. When enabling the ACS mode, the administrator is asked to register the applications with ACS. ACS will now know about the 5 standard user roles (discussed on the next page) and every application and task on the Operations Manager server.

# User Security Administration

## Pre-defined User Roles

- User roles determine the tasks that can be performed by a user
- User profile defines 1 or more user roles

System Administrator	Server configuration and user accounts
Network Administrator	Device configuration
Network Operator	Backup for most configuration management tasks
Approver	Approve jobs that change device software or configuration
Help Desk	View reports (Default User Role – assigned to all users)

- Tasks displayed on desktop change depending on user's assigned role(s)

## Pre-defined User Roles

Operations Manager contains many critical tasks that can modify the behavior of a network, as well as, many totally benign tasks that simply display information. Obviously, it would not be wise to allow all types of users access to the critical functions, but at the same time it would be beneficial to allow all types of users access to the basic information. To allow for proper access to all types of users, Operations Manager employs the concept of User Roles (also known as user privileges or permissions). Use of the various functions or tasks is based upon the “roles” assigned to user accounts. In fact, if a task is not permitted to the user role assigned to the logged in user, then that task will not even be displayed in the navigation tree of the application.

Operations Manager uses five standard User Roles; the five user roles and their basic access ability are:

**System Administrator** – Can perform Operations Manager system administration tasks

**Network Administrator** – Can perform all Operations Manager tasks

**Network Operator** – Can perform all Operations Manager tasks

**Approver** – Not used in Operations Manager

**Help Desk** – View only

In Non-ACS mode (local server authorization) users can be assigned more than one user role, and all are assigned the basic user role – Help Desk. The roles cannot be modified. See next page for user roles assigned to Operations Manager tasks.

In ACS mode (authorization provided by ACS) users can only be assigned one user role per application (basic configuration), but new user roles can be created. Also for further flexibility, user roles can also be assigned per ACS Network Device Group (NDG) per application.

For more information on Security Services provided by Common Services, see the Common Services tutorial.

# User Security Administration

## Permission Report

To view report: [Common Services > Server > Reports > Permission Report](#)

Cisco Unified Operations Manager					
TaskName	System Administrator	Network Administrator	Network Operator	Approver	Help Desk
Add/Delete/Configure Service Monitors		X			
Add/Edit/Delete Event Sets		X			
Add/Edit/Delete IP Phone Collection Schedule		X			
Add/Edit/Delete/Clone/Suspend/Resume Notification Criteria		X			
Add/Modify/Delete LDAP Configuration		X			
Alias Device Details		X			
Analyze Phone Inventory		X			
Analyze Video Phone Inventory		X			
Change Event Description and Severity		X			
Change SNMP Configuration		X			
Clear Alerts and Events			X		
Configure Logging Levels					
Configure Polling and Thresholds		X			
Configure Service Quality Event Settings		X			
Configure System Preferences	X	X			
Configure/Export Personalized Report		X	X		
Create a user-defined Group and enable as View		X	X		
Create/Edit/Delete/Refresh Groups		X			
Create/Import/Modify Batch Tests		X	X		

User Roles

- Permission Report lists all tasks for all applications installed
- Permission to perform tasks are based on user roles

Permission per task per User Role

## Permission Report

In the Non-ACS mode, the tasks that are executable by a user role are static and cannot be changed. Common Services includes a report that displays every task for every application on the local server and which user roles have permission to execute it.

To view the Permissions Report, select **Common Services > Server > Reports**, on the dialog displayed select **Permissions Report** and click **Generate**.

The above picture displays the Permission Report for Operations Manager.

# User Security Administration

## Creating Users (Common Services Authentication)

1 Launches Common Services

2

- Create local user accounts for login
- Assign user roles to determine authority to execute Operations Manager tasks

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## Creating Users (Common Services Authentication)

Common Services allows users with the System Administration user role to create user accounts and assign user roles to the account. Creating a new user is simple and straight forward using the **Common Services > Server > Security > Single-Server Management > Local User Setup** task. A dialog is displayed listing all the currently defined users, click **Add** to create a new user. Simply enter a name and password for the account and assign the user roles that this user is to have. The E-mail address is optional for all user roles except Approver (E-mail is how some scheduled jobs inform an Approver user of a job to approve – See RME tutorial or User Guide for more information about approving jobs).

All users can view their account using the same task, except selecting **ModifyMe** instead of **Add**. Only the password and e-mail address can be modified by user without the System Administrator user role.

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# Periodic Maintenance

- Requirements
- Installation Guidelines
- User Security Administration
- **Periodic Maintenance**
- Helpful Troubleshooting Tips



# Periodic Maintenance Database

Common Services > Server > Admin > Backup

**Set Backup Schedule**

**Backup**

Backup Directory\*:

Generations :  ( 0 turns off generations )

Time :  Hr  Min

Server Date & Time : Wed Nov 02 09:10:13 PST 2005  
(while loading this page)

**Frequency**

Immediate

Daily

Weekly Day of Week :

Monthly Day of Month :

- Backup the database on a regular basis
- CLI can also be used to generate backups (see notes for perl script to run)

Number of Backups to maintain

Schedule Job

## Database Management

It is important that the Operations Manager database be periodically backed up. The system administrator can schedule immediate, daily, weekly, or monthly automatic database backups. The database should be backed up regularly so that you have a safe copy of the database.

To perform an immediate backup or schedule a new one, follow these steps:

1. Go to **Common Services > Server > Admin > Backup**. The Set Backup Schedule dialog box appears.
2. Enter the location of the Backup Directory. It is recommend that your target location be on a different partition than where Operations Manager is installed.
3. Enter the number of backup Generations to be stored in the backup directory
4. Enter the Time for the backup to occur. Use a 24-hour format.
5. Enter the Frequency for the backup schedule to be one of the following:
  - *Immediately* - The database is backed up immediately
  - *Daily* - The database is backed up every day at the time specified
  - *Weekly* - The database is backed up once a week on the day and time specified. Select a day from the Day of week list.
  - *Monthly* - The database is backed up once a month on the day and time specified. Select a day from the Day of month list.

Periodically, examine the log file at the following location to verify backup status:

NMSROOT/log/dbbackup.log

**Note:** You can Backup data using CLI by running the following command:

```
$NMSROOT/bin/perl $NMSROOT/bin/backup.pl <BackupDirectory> [LogFile] [Num_Generations]
```

# Periodic Maintenance

## Software Updates

Common Services > Software Center > Software Update

Products Installed			
Showing 1-3 of 3 records			
	Product Name	Version	Installed Date
1.	<input type="checkbox"/> CiscoWorks Common Services	3.0.1	22 Jan 2006, 09:33:25 PST
2.	<input checked="" type="checkbox"/> CiscoWorks IP Communications Operations Manager	1.0.0	22 Jan 2006, 09:33:26 PST
3.	<input checked="" type="checkbox"/> CiscoWorks IP Communications Service Monitor	1.0.0	22 Jan 2006, 09:33:26 PST

Rows per page: 10 Go to page: 1 of 1 Pages Go

Select an item then take an action --> Download Updates

Click Product Name to see details about the installed versions

Select the Product(s) to download from Cisco.com to file system (No GUI to install software)

Software Updates can be found at the following links, then click [Download Software](#):

- <http://www.cisco.com/en/US/products/ps6535/index.html> (Operations Manager)
- <http://www.cisco.com/en/US/products/ps6536/index.html> (Service Monitor)

## Software Updates

Cisco is continually striving to enhance the software and add support for new devices. Typically, Cisco releases a new service pack on a quarterly basis containing these features. Common Services contains a task that allows the server to check Cisco.com for any updates and download them to the server for subsequent installation.

When accessing the **Common Services > Software Center > Software Updates** task a dialog is displayed showing the bundles and individual applications installed. Clicking on an application will give the details about the Applications and Packages installed with a *Product* page that gives the details of the installed applications, patches, and packages of the product.

To download updates for selected applications, select the desired applications and click the **Download Updates** button. The user will then be prompted for a location on the server to download any updates to. If the user wishes to first select which updates to actually download, click the **Select Updates** button which will present a list of available updates for the selected applications.

**Note:** Each software update is accompanied by a readme file which will provide steps for installation. Software updates are done from a server command line and not the Operations Manager GUI.

# Periodic Maintenance

## Log Files – Common Services

Common Services > Server > Reports > Log File Status

This report shows log file size and file system utilization.

Log file	Directory	File Size (Bytes)	Recommended Size Limit (Bytes)	File System Utilization%
1. perlerr.log	C:\PROGRA~1\CSCOp\log	0	30000	Less than 1%.
2. syslog.log	C:\PROGRA~1\CSCOp\log	68389	30000	Less than 1%.
3. CmfDbMonitor.log	C:\PROGRA~1\CSCOp\log	483	30000	Less than 1%.
4. ESS.log	C:\PROGRA~1\CSCOp\log	1440	30000	Less than 1%.
5. EDS.log	C:\PROGRA~1\CSCOp\log	1382	30000	Less than 1%.
6. jrm.log	C:\PROGRA~1\CSCOp\log	36541	30000	Less than 1%.
7. diskWatcher.log	C:\PROGRA~1\CSCOp\log	21753	30000	Less than 1%.
8. EDS-GCF.log	C:\PROGRA~1\CSCOp\log	894	30000	Less than 1%.
9. Proxy.log	C:\PROGRA~1\CSCOp\log	0	30000	Less than 1%.
10. RmeGatekeeper.log	C:\PROGRA~1\CSCOp\log	726	30000	Less than 1%.

- Command line Perl script (logBackup.pl) monitors the log file sizes
- Script backs up files at 90% of size limit and empties original log file
- **Logrot** Tool is recommended way to maintain logs

Change size limit in `<install directory>/conf/logstat.conf`

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## Log File Management – Common Services

Log files can grow and fill up disk space. There are ways to view the logs, their size, and locations, as well as ways to control their growth.

Using the Log File Status task, you can view information on all the log files used by Operations Manager.

File Size displayed in red means the file exceeds its size limit. File System Utilization displayed in red means the file exceeds 90% utilization. You should reduce the size of your log files if your file system utilization is over 90%.

Since log files can grow and fill up disk space, there is a Perl script (logBackup.pl) that enables you to control this growth by backing up the log file and clearing it. Only log files that reach 90% of their size limits are backed up and the original log file is emptied.

Stop all Operations Manager processes first before using the script.

Files maintained by this script include the Daemon Manager and Daemon process log files. Most log files are located in directories in the PX\_LOGDIR directory - %NMSROOT% /log.

### Logrot Utility

The **logrot utility** helps you manage the log files in a better fashion **and is the recommended approach**. Logrot is a log rotation program that can:

- Rotate log when Operations Manager is running
- Optionally archive and compress rotated logs
- Rotate log only when it has reached a particular size

Logrot helps add new files easily. Logrot should be installed on the same machine where you have installed Common Services. To configure Logrot, refer to the Common Services User Guide, Configuring the Server.

# Periodic Maintenance

## Data Purge

Operations Manager > Administration > Preferences

System Preferences			
<b>Trap Forwarding Parameters</b>			
Trap Server 1:	Not configured	Port:	
Trap Server 2:	Not configured	Port:	
Trap Server 3:	Not configured	Port:	
<b>CiscoWorks Servers</b>			
RME Protocol:	http	Server:	Not configured
Campus Protocol:	http	Server:	Not configured
CiscoView Protocol:	http	Server:	Not configured
<b>Other Preferences</b>			
SNMP Trap Community:	private		
Trap Receiving Port:	162		
SMTP Server:	localhost		
Daily Purging Schedule:	00	:	00
<input type="button" value="Apply"/>			

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## Preferences

Alert and Event History Service Quality History data provides lots of useful information. However, the storing of this data must be maintained to manage the size of the database. Operations Manager is configured to keep and display 31 days of data. Once a day a purging task is executed deleting all data older than 31 days from the database. The administrator can determine when this task is executed by selecting **Operations Manager > Administration > Preferences**. The Daily Purging Schedule can be found and set at the bottom of the dialog.

**Note:** Ensure that no other scheduled task interferes with this task.

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# Helpful Troubleshooting Tips

- Requirements
- Installation Guidelines
- User Security Administration
- Periodic Maintenance
- **Helpful Troubleshooting Tips**



# Helpful Troubleshooting Tips

## System Status

Operations Manager > Administration > System Status

**System Status Report**  
System Status report as of Wed 02-Nov-2005 11:23:55 PST

**Summary**

Processes:	Process information is not available (View details)
Inventory:	Last device discovery in-progress Last device inventory collection in progress Last phone inventory collection status not available (View details)
Data Purging:	Last data purging successful (View details)
Diagnostics:	Synthetic test failure information is not available (View details) Phone status test failure information is not available (View details) Node to node test failure information is not available (View details)
Notifications:	Notification failure information is not available (View details)
System Limits:	Inventory is within limits System load information is not available (View details)

**Processes**

Process Name	Time	Feature Impact
No records.		

**Inventory**

Name	Last Executed	Status	Next Scheduled
Discovery	Sun 30-Oct-2005 21:35:57 PST	In-Progress	Mon 31-Oct-2005 17:00:00 PST
DCR Domain Status	Not Applicable	Isolated	Not Applicable
Device Selection	Not Applicable	Automatic	Not Applicable
Device Inventory Collection	Tue 01-Nov-2005 02:00:04 PST	In Progress	mm/dd/yyyy 2:00 AM weekly
Phone Inventory Collection	Not Available	Not Available	Not Available

System Status report contains details of Operations Manager's activities

Note: report continues on, cropped for display purposes

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## System Status

The System Status Report is useful for troubleshooting purposes in that it contains nearly all facets of Operations Manager configuration and operations. The report is launched by selecting **Operations Manager > Administration > System Status**, and contains the following sections:

- **Processes Status**--Names of processes that failed.
- **Inventory Status**--Displays the name, last execution time, status, and next scheduled time for the following types of data collection: Discovery, DCR Domain, Device Selection, Device Inventory Collection, and Phone Inventory Collection.
- **Data Purging**--Start and end time for database purging task.
- **Diagnostics**--Lists diagnostic tests that failed to execute: Synthetic Tests, Phone Status Tests, and Node-to-Node Tests.
- **Notifications**--Device Event Description, Event ID, Destination(s), Failure Time, Reason.
- **System Limits**--Current value, Limit value, and Limited By for the following parameters: Devices, Phones, IP Communications Monitor, Synthetic Tests, Phone Reachability Tests, Node-to-Node Tests, Devices monitored for Performance and Capacity, and Devices monitored for SRST.

# Helpful Troubleshooting Tips

## Process Status

Common Services > Server > Reports > Process Status

**CISCO SYSTEMS** Common Services Administration.  
Process Status as of Mon Nov 28 15:27:34 PST 2005

Showing 1-20 of 62 records

Process Name	State	Pid	RC	Signo	Start Time	Stop Time	Core	Information
1. Tomcat	Program started - No mgt msgs received	844	0	0	11/28/2005 8:58:01 AM	Not applicable	Not applicable	Application started by administrator request.
2. Apache	Program started - No mgt msgs received	1796	0	0	11/28/2005 8:58:14 AM	Not applicable	Not applicable	Application started by administrator request.
3. TomcatMonitor	Running normally	2508	0	0	11/28/2005 8:58:14 AM	Not applicable	Not applicable	Tomcat Server up
4. SDRPurgeTask	Never started	0	0	0	N/A	Not applicable	Not applicable	Not applicable,
5. RmeOrb	Program started - No mgt msgs received	2348	0	0	11/28/2005 9:00:10 AM	Not applicable	Not applicable	Application started by administrator request.
6. RmeGatekeeper	Program started - No mgt msgs received	4292	0	0	11/28/2005 9:00:14 AM	Not applicable	Not applicable	Server started by admin request
7. EDS	Running normally	4496	0	0	11/28/2005 9:00:18 AM	Not applicable	Not applicable	Initialization complete
8. EDS-TR	Never started	0	0	0	N/A	Not applicable	Not applicable	Not applicable,
9. QOVRRMultiProcLogger	Program started - No mgt msgs received	4952	0	0	11/28/2005 9:00:24 AM	Not applicable	Not applicable	Server started by admin request
10. QOVRRdbEngine	Program started - No mgt msgs received	4984	0	0	11/28/2005 9:00:27 AM	Not applicable	Not applicable	Application started by administrator request.
11. QOVRRdbMonitor	Running normally	5300	0	0	11/28/2005 9:00:31 AM	Not applicable	Not applicable	DbMonitor Running Normally.
12. QOVRR	Program started - No mgt msgs received	5352	0	0	11/28/2005			
13. Proxy	Program started - No mgt msgs received	5364	0	0	11/28/2005			
14. LicenseServer	Program started - No mgt msgs received	5372	0	0	11/28/2005			
15. IVR	Program started - No mgt msgs received	4852	0	0	11/28/2005			
16. ITMCTMStartup	Program started - No mgt msgs received	4840	0	0	11/28/2005			
17. IPLAPurgeTask	Never started	0	0	0	N/A			
18. IPLUdbEngine	Program started - No mgt msgs received	5384	0	0	11/28/2005			
19. IPLUdbMonitor	Running normally	6048	0	0	11/28/2005			
20. IPCDiscovery	Never started	0	0	0	N/A			Not applicable Not applicable Not applicable,

Rows per page: 20

Go to page: 1 of 4 pages

Displays status of all processes. Process State column is displayed in **GREEN** color for the started processes and in **RED** color for the processes which failed to start

\* Note: Red state may be normal – see Information column

## Process Status

Process Status is a Common Services task used to manage all background processes. This report displays the status of all processes. Process State column is displayed in **GREEN** color for the started processes and in **RED** color for the processes which failed to start.

The processes can be viewed by running the **Common Services > Server > Report > Process Status** task.

# Helpful Troubleshooting Tips

## Process Management

Common Services > Server > Admin > Processes

<input type="checkbox"/>	ProcessName	ProcessState	ProcessId	ProcessRC	ProcessSigNo	ProcessStartTime	ProcessStopTime
1 <input type="checkbox"/>	TomcatMonitor	Running normally	6536	0	0	10/25/2005 3:49:50 PM	Not applicable
		Program started - No mgt msgs received	11692	0	0	10/25/2005 3:53:58 PM	Not applicable
3. <input type="checkbox"/>	RmeGatekeeper	Program started - No mgt msgs received	11436	0	0	10/25/2005 3:54:02 PM	Not applicable
4. <input type="checkbox"/>	EDS	Running normally	5160	0	0	10/25/2005 3:54:06 PM	Not applicable
5. <input type="checkbox"/>	EDS-TR	Never started	0	0	0	N/A	Not applicable
		Program started -				10/25/2005	

Select Process to Start/Stop

Select Process Name for details

View status of all background processes and start and stop them if necessary

Start Stop Refresh

To “restart” all processes – open a Command prompt on the server and enter:

To stop all processes: **net stop crmdmgt**

To restart all processes: **net start crmdmgt**

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## Process Management

Process Management is a Common Services task used to monitor and start/stop one or more background processes. In the event something doesn't quite seem right with Operations Manager, the system administrator should first check the processes to ensure that they are running. If not, they can be restarted, or stopped and restarted, in an attempt to fix the problem.

The processes can be viewed by running the **Common Services > Server > Admin > Processes** task.

Process Name, State, PID, RC, SigNo., Start Time and Stop Time are displayed. Core and Information field are not displayed here.

The “Refresh” button is for refreshing the entries in the table.

The Tomcat and Apache processes can not be stopped from this display since communication would be cut between the server and the browser.

To shut down all Operations Manager processes, open a Command Prompt on the server and enter:

**net stop crmdmgt**

To restart all the Operations Manager processes enter:

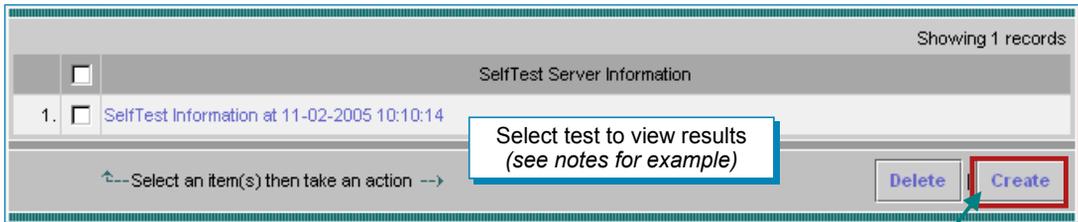
**net start crmdmgt**

**Note:** the command prompt will return fairly quickly after entering the net start command, but the actual start-up process will take 5-10 minutes (Use Task Manager to see the resource usage during the start-up process).

# Helpful Troubleshooting Tips

## Server Self-Test

Common Services > Server > Admin > Selftest



### Run **Selftest** to obtain information on:

- Backup script available and if scheduled
- Test on database processes
- Check on available memory
- Test of lookback address
- Check on recommended DLL versions
- Check platform type supported
- Check SNMP processes

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## Server Self-Test

The Selftest option can display and create self-test reports. You can use this option to test the health and integrity of the system. The option executes various Perl scripts and reports whether or not the test passed or failed. Your login and user role determines whether you can use this option.

Launch the task by selecting **Common Services > Server > Admin > Selftest**. To create a new report, click **Create**. To display the new report or a previously generated report, click the report name. Self-test reports indicate whether the tests passed or failed. Reports reflect the server time.

Excerpts from a selftest report are illustrated below.





# Helpful Troubleshooting Tips

## Log Files – Operations Manager

Operations Manager > Administration > Logging

Logging: Level Configuration					
#	Function/Module	Error	Warning	Info	Debug
1.	Alert and Event History	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Alerts and Events Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Application and Connectivity Poller	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.	Detailed Device View	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Device Fault Integrator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Device Management	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Event Processing Adapters	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Event Promulgation Module	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Graphics Utility	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>OM Log File Location:</b> <b>\$NMSROOT/log</b>					
11.	IP Phone Status	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	IP Phone Status Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.	IP SL & Library	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- By default, Operations Manager writes only error and fatal messages to log files.
- Collect more data when needed by increasing the logging level.

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## Log File Management – Operations Manager

Operations Manager writes application log files for all major functional modules. By default, Operations Manager writes only error and fatal messages to log files. Each module writes to its own folder within the <NMSROOT>\log\itemLogs folder. You cannot disable logging. However, you can collect more data when needed by increasing the logging level and return to the default logging level.

To change the logging level, select **Administration > Logging**. Remember, you cannot disable logging. Operations Manager will always write error and fatal messages to application log files. For each Operations Manager functional module, the Error check box is always selected; you cannot deselect it. To change the logging level for individual modules, simply select one (or deselect all) of the following logging levels for each module that you want to change:

- Warning--Log error messages and warning messages
- Info--Log error, warning, and informational messages
- Debug--Log error, warning, informational, and debug message

Review your changes. To cancel your changes, click the **Cancel** button. Otherwise, click the **Apply** button. Clicking the **Apply** button starts immediately resetting the changed logging levels for the Operations Manager functional modules.

Notes(s):

- *NMSROOT is the folder where Operations Manager is installed on the server. If you selected the default directory during installation, it is C:\Program Files\CSCOpX.*
- *When a log file reaches a preset maximum size, the module backs up the file and starts writing to a new log file. The maximum size for a log file varies by module. The maximum number of backed up log files that a module keeps also varies.*
- *Operations Manager does not automatically reset the DFMServer log file (DFM.log). To maintain good system performance, back up this file when it grows larger than 30 MB. (Refer to the online help, **Maintaining the DFM Log File** for more information on stopping/starting the processes and resetting the file.)*

# Helpful Troubleshooting Tips

## MDC Support Utility

- MDC provides diagnostics results valuable to a Cisco Technical Assistance Center (TAC) representative
- MDC collects the following information and compresses it into a single file to support the MDCs installed
  - Log Files
  - Configuration Settings
  - Memory Information
  - Complete System Information
  - Process Status
  - Host Environment



## MDC Support Utility

The MDC Support utility collects log files, configuration settings, memory info, complete system related info, process status and host environment information. It also collects any other relevant data, into a deliverable tar (compressed form) file to support the MDCs installed.

The MDC Support utility also queries CCR for any other support utilities registered, and runs them. Other MDCs need to register their own support utilities that will collect their relevant data.

Windows:

- Go to: `$NMSROOT\MDC\bin\`
- Run: `MDCSupport.exe`

The utility creates a tar file in `$NMSROOT\MDC\etc` directory. If `\etc` directory is full, or if you want to preserve the data collected previously by not over writing the tar file, you may create another directory by running the following command:

- `MDCSupport.exe` Directory

Before you close the command window, ensure that the MDC Support utility has completed its action. If you close the window prematurely, the subsequent instances of MDCSupport Utility will not function properly. If you happen to close the window, delete the `mdcsupporttemp` directory from `$NMSROOT\MDC\etc` directory, for subsequent instances to work properly.



**CISCO**

**Thank You!**

We hope that you have enjoyed using Unified Communications Operations Manager and have found its features to be an important part of your network-management toolkit.

Cisco Systems

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# Cisco Unified Operations Manager

## References

## Chapter 5



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# Reference Materials

Many Cisco reference documents have been created to help users understand the use of Cisco Unified Operations Manager. However, finding help and documentation can often be a challenge. This reference chapter has been created to assist you in your pursuit of additional product information. Below are links to documents and Web pages that provide further details on Cisco Unified Operations Manager.

- **Cisco Unified Operations Manager (OM)**
  - ◆ **Cisco Unified Operations Manager ([URL](http://www.cisco.com/en/US/products/ps6535/index.html))**  
<http://www.cisco.com/en/US/products/ps6535/index.html>
  - ◆ **Data Sheet ([URL](http://www.cisco.com/en/US/products/ps6535/products_data_sheets_list.html))**  
[http://www.cisco.com/en/US/products/ps6535/products\\_data\\_sheets\\_list.html](http://www.cisco.com/en/US/products/ps6535/products_data_sheets_list.html)
  - ◆ **Install and Upgrade Guides ([URL](http://www.cisco.com/en/US/products/ps6535/prod_installation_guides_list.html))**  
[http://www.cisco.com/en/US/products/ps6535/prod\\_installation\\_guides\\_list.html](http://www.cisco.com/en/US/products/ps6535/prod_installation_guides_list.html)
  - ◆ **Release Notes ([URL](http://www.cisco.com/en/US/products/ps6535/prod_release_notes_list.html))**  
[http://www.cisco.com/en/US/products/ps6535/prod\\_release\\_notes\\_list.html](http://www.cisco.com/en/US/products/ps6535/prod_release_notes_list.html)
  - ◆ **User Guide ([URL](http://www.cisco.com/en/US/products/ps6535/products_user_guide_list.html))**  
[http://www.cisco.com/en/US/products/ps6535/products\\_user\\_guide\\_list.html](http://www.cisco.com/en/US/products/ps6535/products_user_guide_list.html)
  - ◆ **Frequently Asked Questions ([URL](http://www.cisco.com/en/US/products/ps6535/prod_qandas_list.html))**  
[http://www.cisco.com/en/US/products/ps6535/prod\\_qandas\\_list.html](http://www.cisco.com/en/US/products/ps6535/prod_qandas_list.html)
  - ◆ **Deployment Guide ([URL](http://www.cisco.com/en/US/products/ps6535/prod_presentation_list.html))**  
[http://www.cisco.com/en/US/products/ps6535/prod\\_presentation\\_list.html](http://www.cisco.com/en/US/products/ps6535/prod_presentation_list.html)

- **Other Related Material**

- ◆ **Service Monitor (URL)**

- [http://www.cisco.com/en/US/products/ps6536/tsd\\_products\\_support\\_series\\_home.html](http://www.cisco.com/en/US/products/ps6536/tsd_products_support_series_home.html)

- ◆ **IP Communications and Voice Solutions (URL)**

- [http://www.cisco.com/en/US/netsol/ns340/ns394/ns165/networking\\_solutions\\_packages\\_list.html](http://www.cisco.com/en/US/netsol/ns340/ns394/ns165/networking_solutions_packages_list.html)

- ◆ **IEEE 802.3 Inline Power (URL)**

- [http://www.cisco.com/en/US/netsol/ns340/ns394/ns165/networking\\_solutions\\_audience\\_business\\_benefit09186a0080154647.html](http://www.cisco.com/en/US/netsol/ns340/ns394/ns165/networking_solutions_audience_business_benefit09186a0080154647.html)

- ◆ **Deployment of QoS in Converged Networks (PDF)**

- [http://www.cisco.com/application/pdf/en/us/guest/tech/tk759/c1482/cdcont\\_0900aecd8019f3e0.pdf](http://www.cisco.com/application/pdf/en/us/guest/tech/tk759/c1482/cdcont_0900aecd8019f3e0.pdf)

- ◆ **QoS Configuration and Monitoring White Papers (URL)**

- [http://www.cisco.com/en/US/partner/tech/tk543/tk759/tech\\_white\\_papers\\_list.html](http://www.cisco.com/en/US/partner/tech/tk543/tk759/tech_white_papers_list.html)

- ◆ **Network Professionals Connection (URL) <Select Network Management>**

- <http://forums.cisco.com/eforum/servlet/NetProf?page=main>

- ◆ **Cisco's SNMP Object Navigator (URL)**

- <http://tools.cisco.com/Support/SNMP/do/BrowseOID.do?local=en>

- **Online Bug Tracker**

Search for known problems on the Cisco bug tracking system tool, called Bug Toolkit.

To access Bug Toolkit, perform the following steps:

- Click on the link above ([www.cisco.com/cgi-bin/Support/Bugtool/launch\\_bugtool.pl](http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl))
- Login to Cisco.com
- Click **Launch Bug Toolkit**.
- Locate **Operations Manager** from the list of Cisco Software Products
- Then click **Next**.

- **Technical Notes / White Papers**

- ◆ **Network Management Systems: Best Practices White Paper ([URL](#))**

- [http://www.cisco.com/en/US/tech/tk869/tk769/technologies\\_white\\_paper09186a00800ae\\_a9c.shtml](http://www.cisco.com/en/US/tech/tk869/tk769/technologies_white_paper09186a00800ae_a9c.shtml)

- The objective of this paper is to provide some deployment guidelines for all areas of network management: Fault, Configuration, Accounting, Performance, and Security (FCAPS).

