



Lab Testing Summary Report

October 2005
Report 051005

Product Category:
IP Communications and
Network Management
Applications

Applications Tested:

**Cisco IP
Communications Express
Quick Configuration Tool
(QCT)**

**Cisco Catalyst Express
500 Device Manager**

Cisco Network Assistant

**Cisco Voice Provisioning
Tool (VPT)**

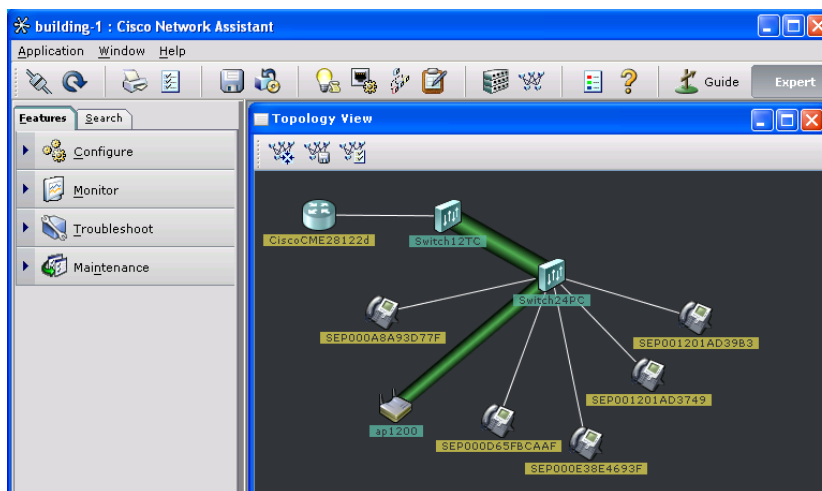
**Cisco IP
Communications
Operations Manager**

**Cisco IP
Communications Service
Monitor**

Key Findings and Conclusions:

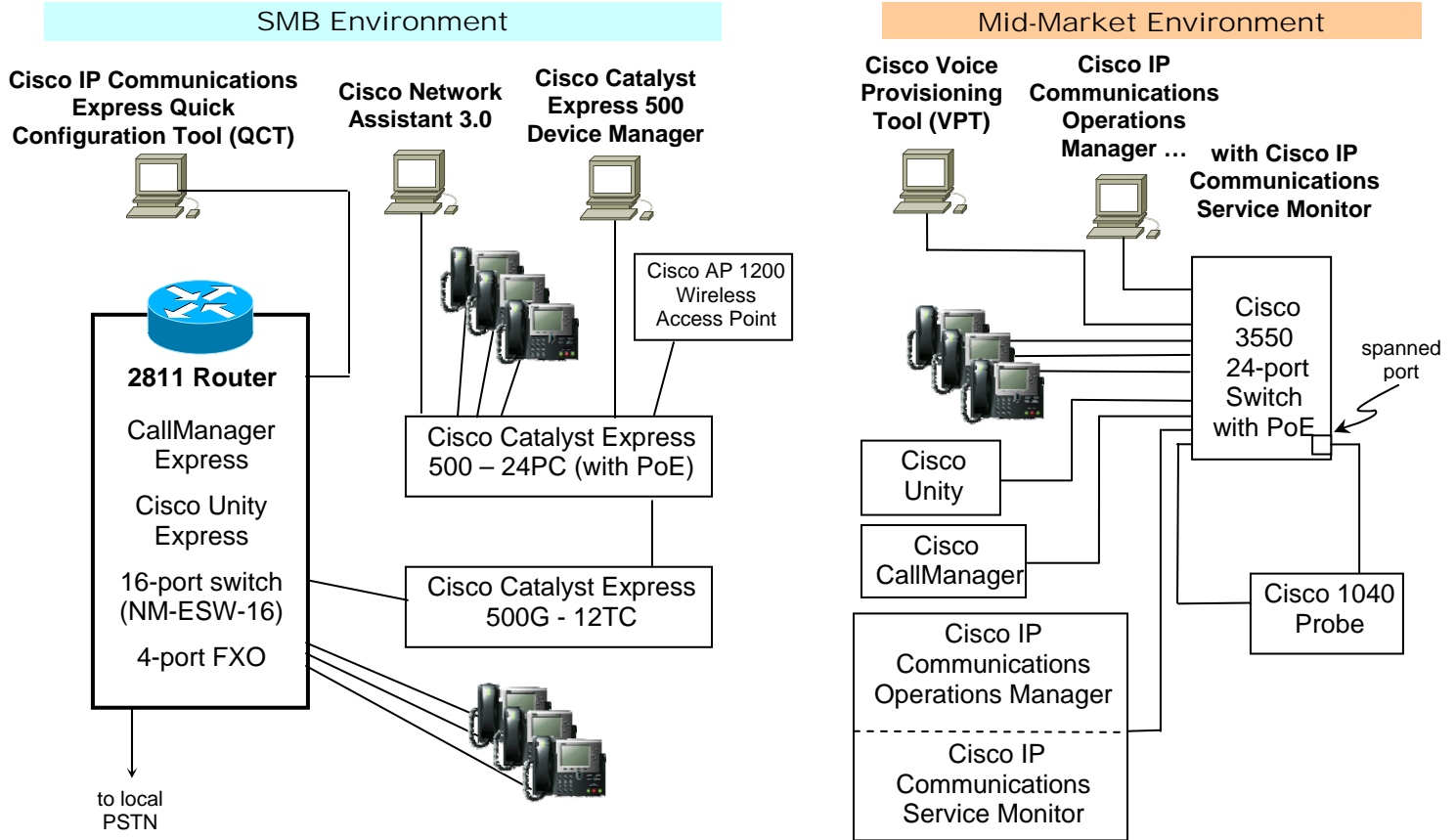
- **New and enhanced Cisco Business Communications Solution applications significantly reduce the time and expertise required to configure and manage new IP-telephony systems**
- **Cisco Catalyst Express 500 switches are easily configured and managed with the Device Manager application and Cisco Network Assistant v3.0.**
- **The Cisco IP Communications Express Quick Configuration Tool lets users configure a complete phone system in under an hour**
- **The Cisco Voice Provisioning tool saves time administering phone-system moves, adds and changes**
- **The Cisco IP Communications Operations Manager discovers, monitors and displays network devices, as well as issues alerts if service quality degrades**

Cisco Systems engaged Miercom to independently review six telephony-related configuration and management tools just released for the SMB and mid-market environments. For Small-to-Medium Business (SMB) IP-telephony systems, the Cisco IP Communications Express Quick Configuration Tool (QCT) lets users efficiently set up new telephony systems. And the Cisco Catalyst Express 500 Device Manager and Cisco Network Assistant v3.0 tools provide both quick configuration and effective management of Catalyst Express 500 switches. For the mid-market, the Cisco Voice Provisioning Tool (VPT), greatly simplifies MACs (Moves, Adds, and Changes). And the Cisco IP Communications Operations Manager and Cisco IP Communications Service Monitor tools facilitate and simplify the management of Cisco IP-telephony networks.



The Cisco Network Assistant 3.0 graphically shows the test network consisting of a Cisco 2811 router, two Cisco Catalyst Express 500 switches, five Cisco IP phones and a Cisco AP 1200 Wireless Access Point

Test Bed Setup



About the Testing: Two test beds were setup: one to represent a small business with a Cisco 2811 Integrated Services router with Cisco CallManager Express and Cisco Unity Express, the other to represent a mid-market or medium-sized business with a Cisco CallManager system and Cisco Unity system.

A first test bed, simulating an SMB (Small-to-Medium Business) environment, was used to evaluate the Cisco IP Communications Express Quick Configuration Tool (QCT), the Catalyst Express 500 Device Manager and the Cisco Network Assistant 3.0 application. The telephony environment was supported by a 2811 router running IOS version 12.3, and Cisco CallManager Express for call processing. The 2811 router also contained an Advanced Integration Module (AIM) with Cisco Unity Express for voicemail and auto attendant. In addition, the 2811 contained a 16-port Ethernet Switch Module (NM-ESW-16), and a 4-port Foreign Exchange Office (4FXO) Voice Interface Card (VIC2-4FXO). The 4FXO module was used to test PSTN connection functions (both inbound and outbound).

The first test bed also contained two Cisco Catalyst Express 500 switches – a model 12TC (WS-CE500<G>-12TC), which is typically used to handle server connections and uplinks/downlinks – and a model 24PC (WS-CE500-24PC), typically used to connect end devices, like IP phones and PCs. A Cisco AP 1200 Wireless Access Point was also connected to the 24PC to evaluate the AP 1200 support that's built into the management applications.

The Cisco 2811 router (16ESW) and the Catalyst Express 500-24PC switch both support PoE (Power over Ethernet), per 802.3af, as well as Cisco's pre-standard PoE.

The second test bed was used to review the Cisco Voice Provisioning Tool and the Cisco IP Communication Operations Manager Tool. All the servers, the Cisco 1040 Sensor and the laptops were connected through a Cisco Catalyst 3550 switch (WS-C3550-24PWR-EMI). The test bed contained a Cisco CallManager Server, v4.1(3) and a Cisco Unity system, v4.0(5), running on Windows 2000 servers. This test bed also included the Cisco IP Communications Operations Manager, v1.0, and the Cisco IP Communications Service Monitor application, v1.0, both installed on a Windows 2003 SP1 system.

Also in the second test bed was a Cisco 1040 Sensor, which monitors RTP streams (IP telephone voice streams) going through the 3550 switch. The sensor was connected to a spanned port, configured to monitor all the switch ports connecting Cisco IP Phones. The sensor also has a management port, connected to another PoE port on the 3550 switch. An assortment of Cisco IP phones models, including Cisco IP Phone 7940, 7960 and 7970, were deployed in both test beds.

Cisco IP Communications Express Quick Configuration Tool (QCT)

We exercised the Cisco IPC Express Quick Configuration Tool (QCT), used to configure the Call Manager Express telephony services and Cisco Unity Express services on the Cisco 2811 router.

QCT is designed to work with a router that has not yet been configured (as factory shipped). We launched QCT from a laptop, connected to the console port of the router.

QCT's user interface, which is well thought out and efficient, is designed around two main screens. The first is for setting the overall system parameters and configuration. The second screen guides the user through configuration of the IP phones. The first screen is dynamic – as particular system parameters are specified, the screen contents change dynamically so further details relating to that parameter can be specified. Also, this tool “auto-detects” the hardware configuration. And reasonable default values for all parameters are provided; the user only needs to customize the installation.

SYSTEM PARAMETERS

General System Information

Company Name: Router's Host Name:

How Many IP Phones going to be Deployed for this site?

Administrator User ID: Administrator Password:

Time Zone: Daylight Saving ☒

Save Generated Configuration to the Start-Up config on the router ☐

Hardware Configuration

Following is the layout of the slot scheme on Cisco 2811 router. For each expansion slot (AIM, HWIC or NM module) that are installed. Slot numbers are labeled next to the physical slot on the router. QCT can automata below.

Auto Detect Hardware Configuration

Router Platform: * This Platform Supports up to 36 IP Phones.

AIM Slots:	0: <input type="text" value="AIM-CUE"/>	1: <input type="text" value="EMPTY"/>
HWIC Slots:	0: <input type="text" value="4FXO"/>	1: <input type="text" value="EMPTY"/>
	2: <input type="text" value="EMPTY"/>	3: <input type="text" value="EMPTY"/>
Module Slots:	1: <input type="text" value="16ESW"/>	VIC 0: <input type="text" value="EMPTY"/> VIC 1: <input type="text" value="EMPTY"/>

System Type Configuration

How will the system be configured?

☐ Configure as a key system (square mode)

☐ Configure as a PBX

QCT allows the system to be configured as a key system (with all line appearances on all phones) or as a PBX.

When evaluating the phone-set-up tool, we used a bar-code scanner. As the phones were unpacked, we scanned their MAC addresses directly into the input fields on the QCT screen. Users' names were entered, and the default values edited to set-up hunt and paging groups.

We built the PBX configuration for our six-phone system in about 20 minutes – for both the CallManager Express and the Unity Express voice mail. The QCT generated a configuration that would otherwise require over 300 command-line entries.

We were impressed that QCT could build a PBX system with only 2 screens of data, while other products involve from 2 to 10 times as many setup screens. This setup requires less telephony or data network expertise than virtually any other SMB system that Miercom has previously tested.

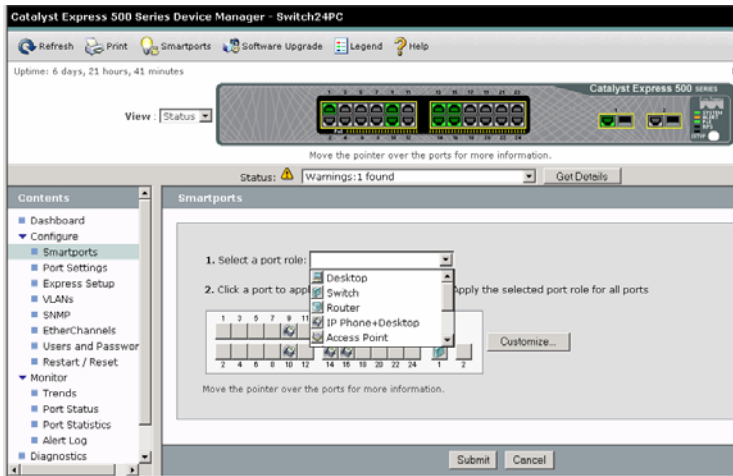
Cisco Catalyst Express 500 Device Manager

Set-up of the Catalyst Express 500 switches using the new configuration capabilities is slick. We followed the “Getting Started Guide” – a step-by-step guide shipped with the switches – which makes it hard to make a mistake. The user unpacks the switch from the box, plugs it in, and presses the “set-up” button. Then you just enter the basic network address parameters, and you're ready to go.

The Cisco Catalyst Express 500 series can be configured either with the Device Manager application, or the Cisco Network Assistant, described in the next section. Our first configuration tasks were to configure the individual ports on the switch. This was easily done with Cisco's “Smartports” facility. Each port is configured by simply defining what the user wants to connect to the port. The port configuration options are replaced with a few clicks on the graphical user interface using Cisco's “Smartport” role configurator. What would have been complex sequences of CLI commands on Cisco switches is now done with a few clicks on the graphical user interface. For our switches, we could configure a switch – from assigning its IP address to defining the roles for the ports – in less than three minutes.

The switch's ports and functions are controlled by assigning Smartport “roles” to each port. Cisco says

the Smartports simplify configuration by incorporating Cisco's CCIE "best practices" of Security, QoS, and Availability in each Smartports role. Users can easily apply one of ten Smartports roles (i.e., Desktop, IP phones and Desktop, server, printer, switch, router, access point, guest, diagnostic (CNA only), and other). With the "guest" Smartports role, guests can access the Internet, but not the internal company network.



In our view, the Catalyst Express 500 switches and the Device Manager application are well suited for the SMB environment. Configuration and management is quick and easy; only minimal technical expertise is needed.

The Device Manager guides the user through VLAN set-up, consistent with these port roles, and detects inconsistent VLAN settings.

The Device Manager also provides other management functions. For example, network statistics including port and switch utilization and packet errors, are displayed graphically. Trend data is maintained for up to 14 days.

Diagnostic tests can be launched from the Device Manager on specific ports, to investigate connectivity or other port problems.

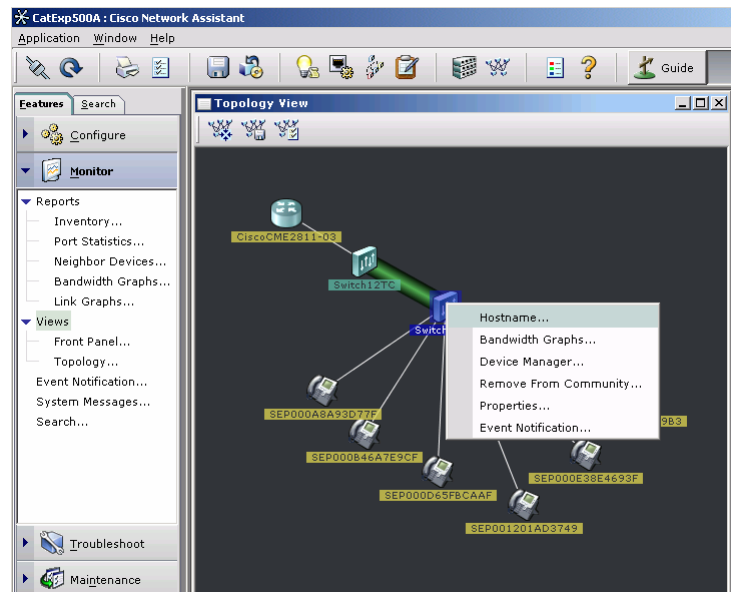
The Device Manager lets you access the alert log, and examine details for each alert. Recommendations as to the possible cause of the alert are also provided as part of the alert detail display.

SMB Environment

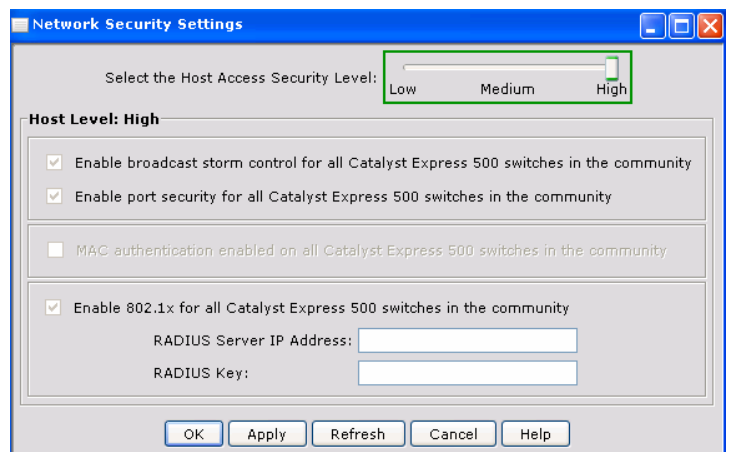
Cisco Network Assistant v3.0

We installed the Cisco Network Assistant v3.0 on a local laptop. This version of the Cisco Network Assistant supports Cisco Catalyst Express 500 switches.

The Cisco Network Assistant provides a global view of the network – it displayed all network devices (the router and the switches) and let us make configuration changes to either of the switches. We could also directly invoke the Device Manager via a right-click selection.

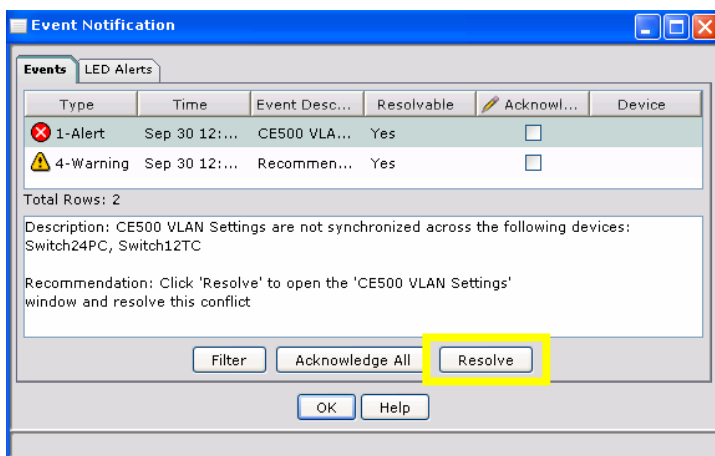


The Cisco Network Assistant 3.0 allows the user to set the security level of the system to "Low", "Medium", or "High". Here again, Cisco CCIE "best practices" are built into the application to allow relatively less experienced users to set their desired security level and then all the necessary configuration changes are made to implement that security level.



The Cisco Network Assistant can detect network problems in the background and issue an alert to the user. The system presents a popup (or user can click an alert icon), to view the problem description and recommended resolution.

The Cisco Network Assistant supports “Drag and Drop Software Upgrades.” Users fetch the appropriate software version from Cisco’s Web site and download it onto a local desktop. Then it is dragged to the device on the topology view, and the tool automatically steps you through the upgrade process. This is much easier than the predecessor TFTP software-upgrade process.



Many steps feature a “Resolve” button, which repairs configuration problems or guides the user through the steps required to fix a problem. This quickly became one of our favorite buttons. Clicking the button provided guidance in fixing the problems we encountered.

We believe that the “resolve” button allows staff members with basic knowledge to fix many problems that would otherwise require an expert.

Mid-Market Environment

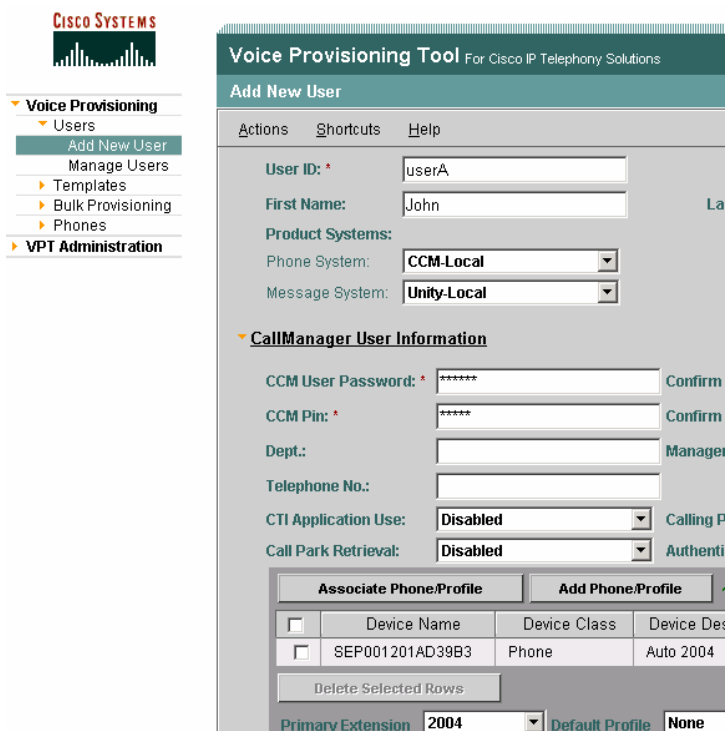
Cisco Voice Provisioning Tool

The Cisco Voice Provisioning Tool (VPT) was tested with a Cisco CallManager and a Cisco Unity system. The VPT focuses on moves, adds and changes (MACs). These are the most frequent administrative tasks performed everyday with a typical phone system.

The Cisco VPT greatly simplifies these changes, mainly because the software offers a network-wide view of the telephony environment, and consolidates the user data – both telephony and voice mail – all on one screen. To add a user, you simply select the CallManager and Unity systems you want, and complete a single screen of user data. When the “Save” button is clicked, the user configuration data is updated automatically on *both* the CallManager and Unity systems. This single “Save” replaces a half-dozen discrete CallManager/Unity update screens.

The Cisco VPT has many other features that expedite moves, adds and changes. For example, a very useful feature is the “multi-modify” facility. This is actually a three-step “wizard”. Here, in the first step the user database is searched for specific users, the second step is to identify the attributes to be updated, and finally in the third step, the common set of changes are applied to all the selected users *in one operation* – on *both* the CallManager and the Unity systems.

Another efficiency feature allows the definition of user and device “templates”. These let repetitive operations be pre-defined into a “template,” and then applied in bulk, with only minimal additional information needed for each update operation. The VPT primarily organizes templates into “user” and “phone” templates. The pre-defined settings can be



set in any of the basic or advanced fields. Even the check-box fields can be preset. With well designed templates, new users can be added in seconds.

Additionally, files can be imported for bulk provisioning operations. You can “bulk import” users and/or phones. One popular operation is to bulk export a set of users, make a common change in the export file and then import the file back into VPT. The bulk import facility maintains its own log file that records the outcomes and any error messages that resulted from the import operation.

To better organize IP-telephony administration, you can segment VPT responsibilities – users can be defined to VPT with specific privileges (or “roles”). In addition to the pre-defined roles that ship with the tool, additional roles can be created to better match an organization’s needs.

Mid-Market Environment

Cisco IP Communications Operations Monitor

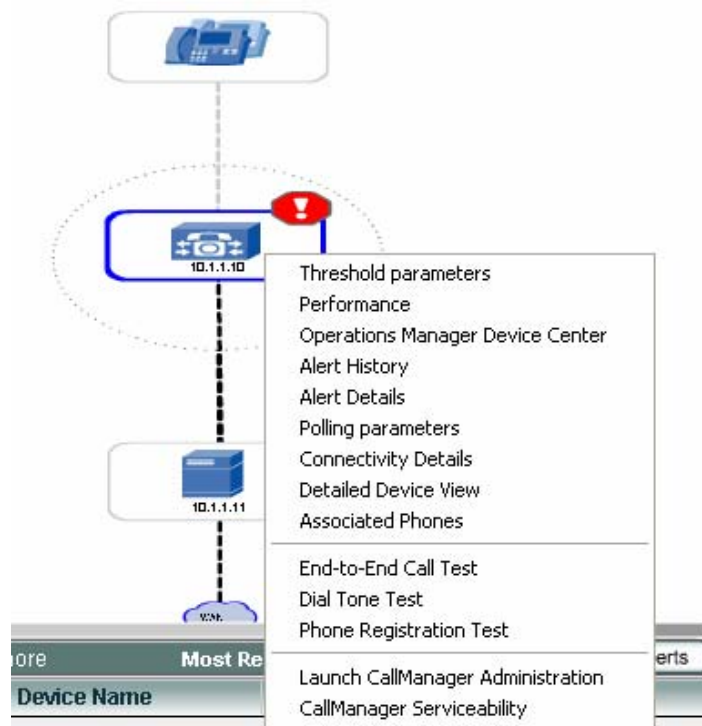
The Cisco IP Communications Operations Manager is a new application that provides the user with a simple and straightforward view into the health of their IP communications network. We think this application is more effective in handling networks comprised of Cisco infrastructure than any other third party management system we’ve used.

As a network management application, the Cisco IP Communication Operations Manager goes well beyond just the management of standard network devices (like routers, switches, etc.), but includes rich functionality for IP Communications elements like Cisco CallManager, Unity, Unity Express, etc. We found all this functionality very well integrated and after only a few minutes very intuitive to use.

The main user interface is a “Dashboard,” which offers four main views into the network: the “Service Level View;” the “Alerts and Events” view; the “Quality Service Alerts” view, and the “Phone Status” view. Separating these views let us quickly focus on the particular aspect of the network operation of interest.

The Service Level View gives a concise, high-level view of the status of the complete IP Telephony network. The tool displays the network separated into functional “clusters,” so any problems or alerts can be quickly associated with the particular portion of the network involved. A graphical connectivity detail view can also be displayed.

The user interface for the tool is conveniently cross-linked, so you don’t have to navigate unnecessary screens to view device status or alerts. Rather, you select an icon on one screen, and right-click an option to go directly to the view, alert details, diagnostic tests, or other applications (see right-click options on the right). Compared to other network management systems, the Cisco IP Communications Operation Manager provides contextual popups specifically designed for managing that device/node.



Impressive diagnostic tests can be setup and run from the IP Communications Operations Manager to verify the proper operation of, or connectivity between, communications nodes.

The diagnostic tests can be launched between real phones, or can use a “synthetic” (simulated) phone, to verify proper operation.

The Cisco IP Communications Operations Manager provides “Service Impact Reports,” which we have not seen on other vendor’s IP telephony management systems. If a failure is detected in part of the network, or even with a specific service running on the CallManager, the “Service Impact” report is displayed showing the specific failure and indicates the end users or services that are affected by the current fault or outage.

The IP Communications Operations Manager also performs functions that might otherwise involve a host of network management applications. These include: discovery of new devices on the network by periodic

scanning; displaying performance graphs of utilization and activity, including telephony-related metrics like CallManager CPU utilization, T1 PRI utilization, and many more; and SNMP-trap forwarding.

A variety of reports can be generated, with output in CSV or PDF format. One of the main reports is the “IP Phone Detail Report,” which displays more detailed phone information than many other management applications. The report is tabular in nature and can be sorted by field. It includes details about each phone including basic information like extension, user and phone model, as well as its registration status (and IP address), which CCM or CME it’s registered with, to which switch and switch port the phone is connected.

Another unique report which is very useful for managing IP telephony equipment is the “Phone Move Report.” This report can aid administrators to detect changes in the IP telephone facilities that would otherwise go unnoticed. The report identifies which phones were moved, and also list the switch and port both before and after the move.

Also, the IP Communications Operations Manager generates Service Quality alerts, working in close association with the Service Monitor software and probe (see below). We ran several tests to trigger specific alerts, and these worked well.

Mid-Market Environment

Cisco IP Communications Service Monitor and the Cisco 1040 Sensor

The Cisco 1040 sensor monitors IP telephony streams, looking for impaired voice quality. When a voice quality problem is detected, the Service Monitor sends an SNMP trap to the Cisco IP Communications Operations Manager, which displays an alert on the Service Quality Alert Detail screen.

The Cisco 1040 sensor monitors VoIP traffic on a LAN connected to a “spanned port” on a switch connecting VoIP phones. This allows multiple conversations to be concurrently monitored by the Cisco 1040 sensor (up to 40).

The Cisco 1040 sensor has a second management LAN port where any detected alerts are reported. The sensor also obtains its power over this port (PoE), which makes deployment very easy – especially because almost all VoIP telephone switches today come with PoE as a standard feature.

In our configuration we only needed to identify the Cisco 1040 sensor to the Cisco IP Communication Service Monitor application. And then, as soon as the sensor was connected to PoE, it booted up and registered to the Cisco IP Communications Service Monitor, all automatically. (This boot-up sequence is very similar to a Cisco IP phone.)

We configured the Cisco 1040 sensor, together with the Cisco IP Communications Service Monitor to trigger based on degraded MOS value (Mean Opinion Score). The MOS value is widely used in the VoIP environment to assess the user’s perception of the phone call quality.

Then, we connected a Cisco IP Phone 7970 our lab through a network impairment generator that degraded the voice quality. We setup conditions that artificially introduced packet loss, jitter and latency. During our test phone call, Cisco 1040 sensor measured a MOS value which was below the threshold we defined. This condition signaled a Service Quality Alert.

The alert was indicated on the Cisco IP Communications Operations Monitor screen, and we could click on the alert and drill down to view all the details about the network conditions that degraded the VoIP phone call. This included a breakout of the packet loss and jitter conditions that contributed to lowering that phone call’s MOS value.

Cisco Systems Service Quality Alert Detail
as of Wed 28-Sep-2005 14:44:11 EDT

Destination: 2002 **Destination Type:** IP Phone
Status: Active **Age:** 282 hr 22 min **ID:** 00000RY

Events: (3)

#	!	MOS	Cause	Timestamp	Codec	Source Type	Se
1.	!	3.2	PacketLoss	28-Sep-2005 14:38:18	G711	IP Phone	2004
2.	!	4.4	Jitter	28-Sep-2005 13:41:18	G711	IP Phone	2004
3.	!	4.4	Jitter				

Event ID: 00000UM

Property	Value
Destination	2002
Destination IP Address	10.1.1.103
Destination Type	IP Phone
Destination Model	7940
Switch For Destination	N/A
Destination Port	N/A
SourceEndPoint	2004
Source IP Address	10.1.1.105
Source Type	IP Phone
Source Model	7970
Switch For Source	10.1.1.2
Source Port	Fa0/15
Detection Algorithm	null
MOS	3.2
Critical MOS Threshold	3
Cause	Packet Loss
Codec	G711
Jitter	10 ms
Packet loss	25 Packets
Probe ID	A105

Clear Close

Summary of Miercom Evaluation

Based on Miercom's comprehensive examination of these applications' operation, capabilities and features, as described herein, we hereby attest to these findings:

- The new and enhanced Cisco IP-telephony applications significantly reduce the time and expertise required to deploy, configure and manage new Cisco IP-telephony systems
- The Cisco IP Communication Operations Manager can discover, display and monitor network devices. The IP Communications Service Monitor, together with the Cisco 1040 Probe, can generate alerts whenever service quality degrades
- The Cisco Voice Provisioning Tool can save substantial time in administering day-to-day phone-system moves, adds and changes
- The Cisco IPC Express Quick Configuration Tool lets a user configure a complete SMB IP-telephony system on a 2811 Integrated Services Router in less than an hour
- The Cisco Catalyst Express 500 switches are easily configured and managed with the Cisco Catalyst Express 500 Device Manager application and Cisco Network Assistant v3.0 application.



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About Miercom's Product Testing Services...

With hundreds of its product-comparison analyses published over the years in such leading network trade periodicals as *Business Communications Review* and *Network World*, Miercom's reputation as the leading, independent product test center is unquestioned. Founded in 1988, the company has pioneered the comparative assessment of networking hardware and software, having developed methodologies for testing products from SAN switches to VoIP gateways and IP PBX's. Miercom's private test services include competitive product analyses, as well as individual product evaluations. Products submitted for review are typically evaluated under the "NetWORKS As Advertised™" program, in which networking-related products must endure a comprehensive, independent assessment of the products' usability and performance. Products that meet the appropriate criteria and performance levels receive the "NetWORKS As Advertised™" award and Miercom Labs' testimonial endorsement.



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