

CiscoWorks Internetwork Performance Monitor 4.0

Product Overview

The CiscoWorks Internetwork Performance Monitor (IPM) is a network response-time and availability troubleshooting application. Included as part of the CiscoWorks LAN Management Solution (LMS), this tool empowers network engineers to proactively troubleshoot network performance using real-time and historical reports. This provides valuable input to the network administrator for capacity planning. This also provides valuable insight into the availability and response times of network services such as Dynamic Host Control Protocol (DHCP), Domain Name System (DNS), HTTP sever, etc.

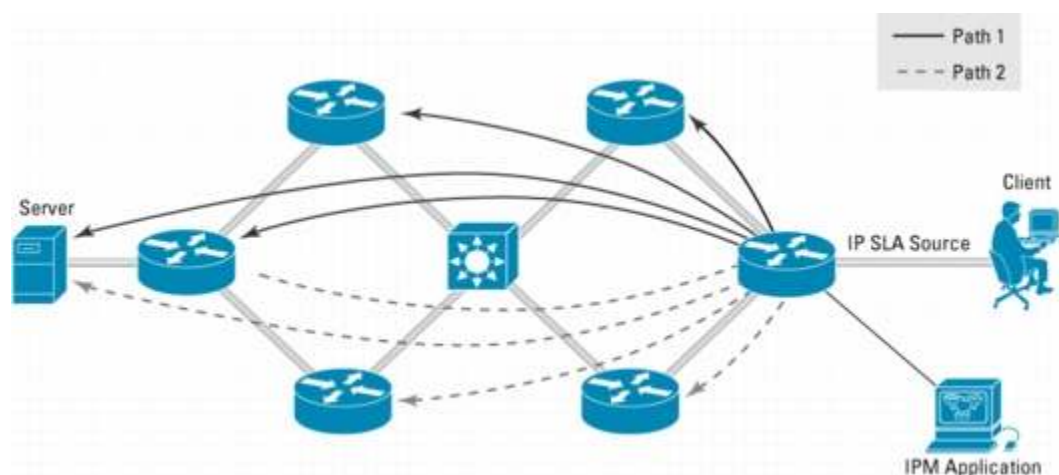
As enterprise networks continue to grow in size, scope, and strategic importance, network managers face numerous challenges in maintaining the performance and availability of their network. Furthermore, as customers deploy new network applications and services such as IP Communications and streaming video, measurements of network performance must recognize different levels of performance based on these different types of network traffic.

To maintain network performance, network managers often spend too much time trying to identify the source of performance problems, and too little time solving them. This reactive approach to network-performance management has become increasingly unwieldy. The network manager needs performance-troubleshooting tools that can identify potential performance problems before they seriously impact users, and quickly identify the network devices that caused the performance problems after they have occurred. The ability to measure network-response time, determine device availability, analyze response-time patterns, and provide performance reports-both real-time and historical-are high-priority requirements in today's enterprise networks.

CiscoWorks IPM satisfies these requirements by performing proactive measurement of network-response time and availability, including both real-time and historical analysis.

CiscoWorks IPM measures network performance based on the "synthetic traffic-generation" technology within Cisco IOS[®] Software, which is known as Cisco IOS IP Service Level Agreement (IP SLA). The use of synthetic traffic by CiscoWorks IPM gives the network manager a high degree of flexibility in selecting the endpoints in a network between which network performance will be measured. This flexibility makes CiscoWorks IPM a highly effective performance-troubleshooting tool.

CiscoWorks IPM takes advantage of Cisco IOS IP SLA technology by configuring network-performance agents, called "collectors," in the router. These "collectors," as part of their configuration, include a "source" router, a "target" device, and an "operation" type. Figure 1 depicts how the Cisco[®] router, acting as a CiscoWorks IPM source device, measures network performance to a target device across the network. See Figure 1.

Figure 1. Cisco IOS IP SLA Source Device

The definition of a CiscoWorks IPM operation includes the protocol type, the measurement interval, the packet size, and the IP Precedence value. CiscoWorks IPM can measure performance based on a variety of network protocols, including Internet Control Message Protocol (ICMP) Echo, IP Path Echo, User Datagram Protocol (UDP) Echo, UDP Jitter, TCP Connect, DNS, HTTP (for static URLs), DHCP, and data-link switching (DLSw), RTP, VoIP Gatekeeper Delay, VoIP Call Setup, and ICMP Jitter. UDP Jitter additionally supports MOS (Mean Opinion Scores) and ICPIF (Calculated Planning Impairment Factor) features. Furthermore, for networks that have deployed quality of service (QoS) based on IP Precedence, CiscoWorks IPM can measure performance for any of these protocols across any of the six values of IP Precedence. As a result, CiscoWorks IPM provides an accurate representation of network performance by measuring the performance of "synthetic" traffic that closely resembles "real user" traffic. Therefore, CiscoWorks IPM facilitates performance measurement of differentiated services (for example, voice, video, and data) in an enterprise network.

After a CiscoWorks IPM collector is configured and deployed in the source router, IPM will continuously collect performance information, based on the parameters of the collector that has been defined, for the following performance metrics:

- Latency
- Jitter (for UDP jitter operation type only)
- Availability
- Errors
- Packet loss

New Features in Internetwork Performance Monitor 4.0

The following are the new features and enhancements in Internetwork Performance Monitor (IPM) 4.0

- Ability to add Adhoc Target Devices
- One-Step Multiple IPSLA Collector Creation
- Richer Graphs and Improved Reports
- Overlay graphs for comparing polling intervals and collectors

- Light weight HTML UI
- Support for more IP SLA Operations - RTP, VoIP Gatekeeper Delay, VoIP Call Setup, and ICMP Jitter. Also UDP Jitter which additionally supports MOS (Mean Opinion Scores) and ICPIF (Calculated Planning Impairment Factor) features.
- Improved Infrastructure Support with integration with LMS 3.0
- Customizable Polling Frequency for shorter durations of 1,5,15, 30 minutes besides the default 60 minutes polling interval.
- SNMPv3 AuthnoPriv support

CiscoWorks Internetwork Performance Monitor Features and Benefits

CiscoWorks IPM helps the network engineer to proactively monitor network response time for problems. CiscoWorks IPM notifies the network engineer when response time degrades or a monitored link becomes unavailable, and helps pinpoint the link causing the problem.

Rapid problem diagnosis leads to higher network availability and allows network managers to alleviate performance bottlenecks quickly. CiscoWorks IPM shows all paths between source and target, and the response time associated with each path. This feature helps network designers analyze how often each path is used and the response time that end users are seeing when their sessions are being routed over a particular path. Performance measurements can be taken for an entire path or for each hop within a path. These features allow network managers to diagnose the source of a performance problem to a specific hop in the network.

Table 1 lists the features and benefits of Cisco Internetwork Performance Monitor.

Table 1. Features and Benefits

Feature	Benefits
Troubleshooting Network Servers - Is it a Problem with the Server or the Network?	<ul style="list-style-type: none"> • Today's business applications rely on several technical components to function properly. The two basic components are the network and a computer workstation, or server, which provides applications to network users. When problems with networked applications arise, network managers may spend much of their time determining if the problem is with the network or the server. In enterprises with different groups administering the network and servers, this diagnosis must be made quickly to expedite resolution to the problem. • CiscoWorks IPM measures response time between a Cisco router and any endpoint with an IP address. This endpoint may be a server, a user's workstation, another router-any device on the network with an IP address. With the ability to monitor network performance between end users and the servers, CiscoWorks IPM aids in diagnosing whether a problem is due to a server or the network.
Baseline Network Performance	<ul style="list-style-type: none"> • The key to managing response time for a given network and its critical paths is to be able to quickly determine performance variances from the norm, which is called the baseline performance. This baseline helps the network engineer to determine acceptable response-time values for critical paths. Future measurement results that vary significantly from the baseline would indicate network problems. • CiscoWorks IPM measures response time and availability for specific network paths. These measurements are presented graphically and show the average, minimum, and maximum response times for a specific period of time. These reports can be used to set response-time thresholds within CiscoWorks IPM. Threshold violations will then indicate when a network problem causes performance to vary from the baseline.

Monitor Response Time, Thresholds, and Availability	<ul style="list-style-type: none"> • CiscoWorks IPM facilitates the continuous monitoring of response time between network-device pairs using Cisco IOS IP SLA technology. CiscoWorks IPM configures the IP SLA on a router to send notification using SNMP trap or network management vector transport (NMVT) alert whenever response-time thresholds are exceeded or network availability has been lost between the router and any other network device. The thresholds that CiscoWorks IPM configures on the router can be tuned to the appropriate level of sensitivity based on the following configuration parameters. <ul style="list-style-type: none"> - Rising thresholds-Notification occurs when the response-time value rises above a specified level. - Falling thresholds-Notification occurs when the response-time value falls below a specified level. - Immediate thresholds-Notification occurs when one sample violates the threshold. - Intermittent threshold-Notification occurs based on the threshold being satisfied a specified percentage of the time. - Average threshold-Notification is based on the threshold being exceeded on average. In this case, notifications are not issued until a specified number of samples have been taken.
Report on Performance for Specific Network Paths	<ul style="list-style-type: none"> • CiscoWorks IPM also provides graphical reports on response-time performance and availability for a specified time period for individual network paths. These reports contain: <ul style="list-style-type: none"> - Response-time analysis <ul style="list-style-type: none"> ◦ Average response time ◦ Minimum response time ◦ Maximum response time - Availability analysis <ul style="list-style-type: none"> ◦ Type of connectivity errors ◦ Frequency of connectivity errors ◦ When errors occurred - Overall statistics <ul style="list-style-type: none"> ◦ Percentage of sampled traffic complying with thresholds ◦ Percentage of sampled traffic violating thresholds ◦ Percentage of sampled traffic with errors
Troubleshooting Performance of IP-Based QoS	<ul style="list-style-type: none"> • Measuring performance in an enterprise network has become increasingly complex as the variety of network applications, each with their own performance requirements, has grown. The evolution of such differentiated network services means that there is no longer a single level of performance expected between any two points in a network. Instead, there is likely to be a range of performance levels expected between any two points in a network, with a different expectation of performance for each category or class of network traffic. The capability of a network to deliver different levels of performance to different classes of traffic is referred to as network quality of service or QoS. Network-performance troubleshooting tools need to be capable of measuring network performance based on different classes of traffic. • CiscoWorks IPM provides the capability to measure network performance for different traffic classes. It achieves this by supporting user configuration of the IP Precedence value in the synthetic traffic that it generates to measure network performance. By configuring the IP Precedence value within CiscoWorks IPM, network managers can simulate the traffic classes that are assigned to the various IP Precedence values that travel through their network. As a result, CiscoWorks IPM is an essential tool for measuring end-to-end performance of the various traffic classes in a QoS-enabled network, and for troubleshooting such a network when QoS expectations are not achieved.
Troubleshooting Network Performance for IP Communications	<ul style="list-style-type: none"> • Perhaps the best example of the kind of differentiated services that data networks will be expected to support is IP Communications including voice over IP (VoIP). Obviously, the performance characteristics of digitized voice traffic in a data network, with its requirement for low latency, are quite different from traditional data applications. • For IP Communications, CiscoWorks IPM can be used for performance troubleshooting to allow rapid identification and isolation of any performance problems and, thereby, help ensure continuous voice and communication services in the network. CiscoWorks IPM can identify and isolate specific network paths where the latency and jitter measurements of the network have risen above performance levels necessary to support high-quality telephony services. • CiscoWorks IPM is capable of providing detailed jitter analysis between the source and target devices in an IPM collector. This detailed analysis includes both positive and negative jitter, as well as forward and reverse jitter between the source and target

New features in addition to the items above are:

- UDP Jitter operation with MOS (Mean Opinion Score) and ICPIF (Calculated Planning Impairment Factor) parameters on IP SLA routers having IOS version greater than 12.3 (70) is also supported.
 - Mean Opinion Score (MOS) provides a numerical measure of the voice quality in the network. It is expressed as a single number in the range 1 to 5, where 1 is lowest perceived quality, and 5 is the highest perceived quality.
 - ICPIF - Calculated Planning Impairment Factor loss/delay busyout predefined combinations of loss and delay. Packet loss and initiating the busyout state. ICPIF range from 0 to 55.
- Real-Time Transport Protocol (RTP)-based Voice over IP (VoIP) Operation feature provides the capability to set up and schedule a test call and use Voice source router digital signal processors (DSPs) to gather network performance-related statistics for the call.
 - Available statistical measurements for VoIP networks include jitter, frame loss, Mean Opinion Score for Conversational Quality (MOS-CQ), and Mean Opinion Score for Listening Quality (MOS-LQ).
- VoIP Call Setup feature provides the ability to measure your network's response time for call.
 - When using H.323 or Session Initiation Protocol (SIP), the IP SLAs VoIP the total time from when an originating gateway sends a call message (the originating gateway receives a message from the terminating gateway either the called number rang or the called party answered the call.
- The VoIP (Voice over IP) Gatekeeper Registration Delay operation determines the average, median, or aggregated response time (delay) of registration attempts from a VoIP source router to a VoIP gatekeeper device.
 - To measure VoIP gatekeeper registration response time, the gatekeeper registration delay operation sends a lightweight Registration Request (RRQ) from a source router to a gatekeeper and records the amount of time taken to receive the Registration Confirmation (RCF) back from the gatekeeper.

System Requirements

Please refer to the CiscoWorks LAN Management Solution 3.0 Product Datasheet, under the Product Literature section at <http://www.cisco.com/go/lms>, for specific hardware and software server and client requirements.

Ordering Information

CiscoWorks Internetwork Performance Monitor is part of the CiscoWorks LAN Management Solution (LMS). CiscoWorks LMS is available for ordering through regular Cisco sales and distribution channels worldwide.

To place an order, visit the [Cisco Ordering Home Page](#).

Service and Support

Using the Cisco Lifecycle Services approach, Cisco and its partners provide a broad portfolio of end-to-end services and support that can help increase your network's business value and return on investment. This approach defines the minimum set of activities needed, by technology and by network complexity, to help you successfully deploy and operate Cisco technologies and optimize their performance throughout the lifecycle of your network.

For More Information

For more information about the CiscoWorks Internetwork Performance Monitor application, visit <http://www.cisco.com/go/lms> or contact your local Cisco account representative or send an email to the Product Marketing group at lms-pm@cisco.com.



Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Europe Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: +31 0 800 020 0791
Fax: +31 0 20 357 1100

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