DATA SHEET

CISCO IOS IP SERVICE LEVEL AGREEMENTS FOR VOICE OVER IP NETWORKS

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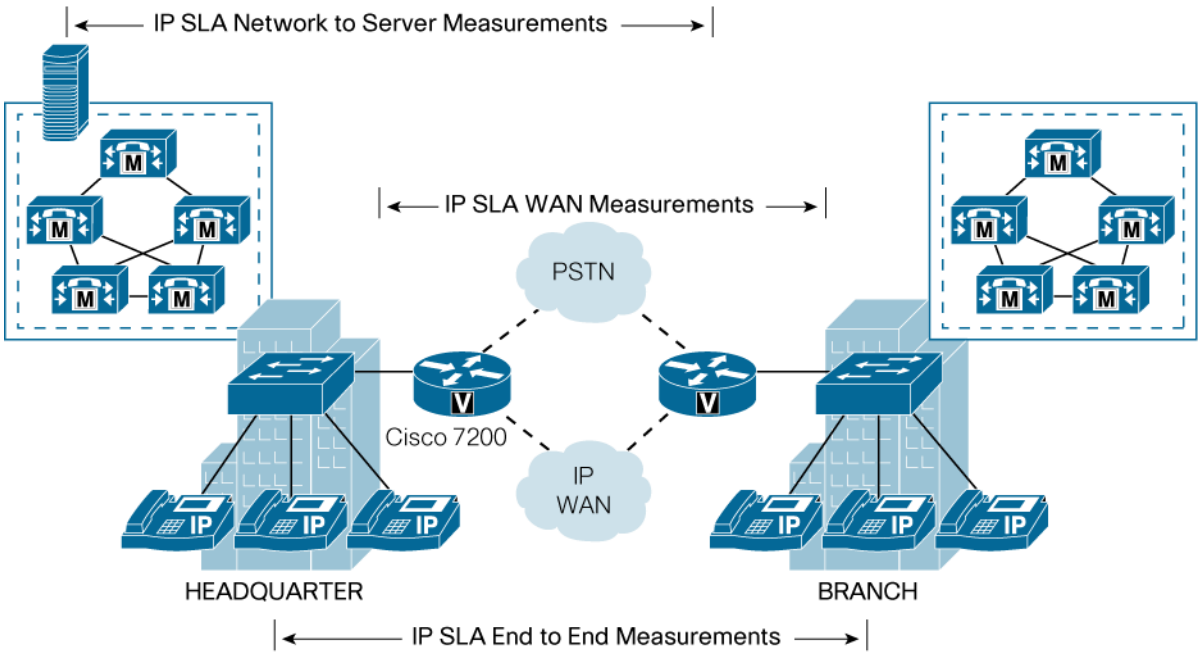
Network services have changed dramatically in recent years, most notably due to the addition of voice, video, and mission-critical data to existing data traffic. Customers demand guaranteed reliable network services for business critical applications. Cisco IOS® IP Service Level Agreements (SLAs) is a network performance measurement and diagnostics tool that uses active monitoring, which generates traffic in a reliable and predictable manner to measure network performance.

Cisco IOS IP SLAs actively send data across the network to measure performance between multiple network locations or across multiple network paths. It simulates Voice over IP (VoIP) codecs and collects real time network performance information, including response time, one-way latency, jitter, packet loss, and voice quality scoring. It also provides the mechanism to monitor performance for different classes of traffic over the same connection. Cisco IOS IP SLAs also enable proactive notification of network issues.

THE CHALLENGE

It is difficult to understand the ability of the network to support voice traffic and Quality of Service (QoS) prior to a VoIP deployment. Network administrators need new tools to understand the network and monitor its performance. This information is essential to providing reliable service.

Figure 1. End to End Performance Monitoring with IP SLAs for a VoIP Network



THE SOLUTION: CISCO IOS IP SLAS

Cisco IOS IP SLAs is embedded within Cisco IOS Software and provide a scalable, cost-effective solution for network performance measurement. It eliminates the need to deploy dedicated monitoring devices by including the “probe or agent” capabilities in network devices. Cisco IOS IP SLAs collect real time network performance information, including response time, one-way latency, jitter, packet loss, and voice quality measurement. It also provides a mechanism to monitor performance for different classes of traffic over the same connection.

Administrators can leverage Cisco IOS IP SLAs to determine whether the network is ready to use the Cisco router to simulate VoIP codecs and measure network performance and VoIP quality (Mean Opinion Score [MOS]) across the IP network.

Cisco IOS IP SLAs active monitoring can continuously measure the network performance between multiple paths in the network, providing ongoing baseline information.

Network administrators can also use Cisco IOS IP SLAs as a troubleshooting tool. They can obtain hop-by-hop performance statistics between two Cisco routers or between a router and a server. If the network performance level drops during operation (ie: due to congestion), the network administrator can promptly identify the location of the bottleneck and resolve the problem.

KEY BENEFITS

- Embedded in Cisco IOS Software
- Automated, real-time, accurate network performance and network health monitoring
- VoIP codec simulation and VoIP quality measurement (MOS and Calculated Planning Impairment Factor [ICPIF])
- Per-class QoS traffic monitoring
- Flexible scheduling
- Proactive notifications with Simple Network Management Protocol (SNMP) trap
- Hop-by-hop and end-to-end performance measurement
- Controlled through SNMP or Cisco IOS Software Command Line Interface (CLI)
- Extensive partnerships with industry leaders

HOW IT WORKS

Cisco IOS IP SLAs measure performance by sending one or more packets to a destination IP device or a Cisco router. Packets are echoed back to the sender, similar to PING functionality. Cisco IOS IP SLAs use the timestamp information to calculate performance metrics, including jitter, latency, response time, packet loss, and MOS and ICPIF voice quality scores.

A destination router that is running Cisco IOS Software can be configured as a Cisco IOS IP SLA responder. It processes measurement packets and provides detailed timestamp information. The responder has intimate knowledge of Cisco IOS Software processing, and it can send information about the destination router’s processing delay back to the source Cisco IOS IP SLA. This delay is removed during calculation to further improve accuracy. Cisco IOS IP SLAs also enable unidirectional measurements.

VoIP networks frequently include QoS class-based performance. Cisco IOS IP SLAs can be configured to monitor per-class traffic over the same link by setting the Diff-Serv Code Point (DSCP) bits.

Users can schedule a Cisco IOS IP SLA operation at any point in time or continuously over any time interval. This flexible scheduler makes the feature suitable for both performance monitoring and troubleshooting.

Cisco IOS IP SLAs provide a proactive notification feature with SNMP trap. Each measurement operation can monitor against a pre-set performance threshold. Cisco IOS IP SLAs generate a SNMP trap to alert management applications when this threshold is crossed. This alert occurs if the network jitter, packet loss, latency, or MOS score exceeds a specified value between any two points in the network, and a trap sent to an NMS can alert the network administrator. Administrators can also configure Cisco IOS IP SLAs to run a new operation automatically when the threshold is crossed. This feature, combined with hop-by-hop measurement capability, enables immediate real-time problem analysis when a problem arises.

Network performance measurement results are available with both SNMP and the Cisco IOS Software CLI.

OPERATIONS SUPPORTED

Table 1. Cisco IOS IP SLAs Operations and Applications

	Measurement Capability	Key Applications
UDP Jitter for VoIP	• Round-trip delay, one-way delay, one-way jitter, one-way packet loss • VoIP codec simulation G.711 ulaw, G.711 alaw, and G.729a • MOS and ICPIF voice quality scoring capability • One-way delay requires time synchronization between the Cisco IOS IP SLAs source and target routers	Most common operations for networks that carry voice traffic, such as IP backbones
UDP Echo	Round-trip delay	Accurate measurement of response time of UDP traffic
UDP Jitter	• Round-trip delay, one-way delay, one-way jitter, one-way packet loss • One-way delay requires time synchronization between the Cisco IOS IP SLAs source and target routers	Most common operations for networks that carry voice or video traffic, such as IP backbones
TCP Connect	Connection Time	Server and application performance monitoring
Domain Name System (DNS)	DNS Lookup Time	DNS performance monitoring, trouble-shooting
Dynamic Host Configuration Protocol (DHCP)	Round-trip time to get an IP address	Response time to a DHCP server
FTP	Round-trip time to transfer a file	FTP get performance monitoring
HTTP	Round-trip time to get a Web page	Web site performance monitoring
Internet Control Message Protocol (ICMP) Echo	Round-trip delay	Trouble-shooting and availability measurement
ICMP Path Echo	Round-trip delay for the full path	Trouble-shooting
ICMP Path Jitter	Round-trip delay, jitter and packet loss for the full path	Trouble-shooting
Data Link Switching Plus (DLSw+)	Peer tunnel performance	DLSw peer tunnel performance monitoring

PARTNER APPLICATIONS

Cisco IOS IP SLAs integrate with many industry-leading performance management applications, which provide graphical front ends for configuring operations, analyzing performance metrics, and detailed reports.

Multiple applications rely on Cisco IOS IP SLAs to collect performance measurements:

- Cisco Systems
  - Cisco Works Performance Monitor (IPM)
  - IP Solution Center
  - CiscoWorks IP Telephony Environment Monitor
- Agilent
  - Agilent OSS QoS Manager
- Concord
  - eHealth
- Crannog Software
  - Response Watch
- InfoVista
  - VistaView
  - InfoVista News
- HP Openview
  - Performance Insight
- Micromuse/Quallaby
  - ISM
- Wired City
  - IT Monitor
- Open source or Freeware products
  - MRTG

ADDITIONAL INFORMATION

For more information on Cisco IOS IP SLAs, please visit http://www.cisco.com/go/ipsla/

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