SolarWinds Technical Reference

Transitioning to IP SLA Manager from VoIP Monitor

This paper examines applying the Plan, Design, Implement, Operate, Optimize (PDIOO) methodology to structure the transition from VoIP Monitor 2.1 to IP SLA Manager 3.0.

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Scope

This document assumes you have already completed the upgrade process from Orion 9.5 (SP4) and VoIP monitor 2.1 to Orion IP SLA Manager 3.0. It is written specifically for users of Orion VoIP Monitor who are transitioning to IP SLA Manager, but new users of IP SLA Manager may also find it useful.

One thing you will notice when the upgrade process completes is that all of the VoIP Monitor abilities are still in place in IP SLA Manager and that all the VoIP monitoring paths and equipment you were previously monitoring is still in place. There is no need to re-add or reconfigure your VoIP monitoring. The VoIP resources can be found on the IP SLA Manager Summary page, the Top 10, tab and the VoIP tab.

Adding IP SLA Measurements using PDIOO Methodology

As with all SolarWinds software, we have made IP SLA Manager easy to install, configure and use. IP SLA operations, when properly implemented, provide proactive network management and tremendous insight into network performance. When improperly implemented, IP SLA measurements can yield misleading information about network performance and at worse, can even adversely impact network performance. For this reason, it is highly recommended, to carefully plan your testing strategy before implementation. PDIOO is a five phase process for the implementation of new technologies. The five phases of PDIOO are

Planning

Design

Implementation

Operation

Optimization

In this paper I have taken each of the steps of PDIOO and created tools to apply this methodology to Orion IP SLA Manager. The most involved section of this methodology will be the planning and design.

Phase 1 – Planning

PDIOO planning starts with information and requirements gathering. In order to plan for a successful implementation, we need to know a bit about the network and the services the implementation is expected to deliver. Here is what I believe to be a good sample of the type of information to collect:

A logical, global network map with WAN connections, link bandwidth, and locations of network services. Hopefully a copy you can mark up for planning and design.

Site maps for large or complex sites.

A list of time sensitive network applications (VoIP, Video, etc).

A list of protocols and ports used to carry critical data.

The locations for network services servers and users (FTP, DHCP, DNS, VOIP, etc). It is helpful if these are indicated on the network map.

IP SLA operations can be thought of as performing two types of tests, path tests and point tests. I use the following to define these tests:

Path tests are operations designed specifically to test the quality of service along a certain network path. An example of a path test would be a UDP Jitter IP SLA operation originating from the edge router at site A and targeting the edge router at site B. The operation tests path's the ability to carry jitter sensitive data from site A to site B.

Point tests are operations designed to test a service's availability without regard to the network path. For example an IP SLA operations originating at each sites edge routers targeting the corporate DNS servers. The objective of the test is not to assure certain paths can carry DNS but to assure DNS is available at every site.

The only reason I break these up this way is that I find it easier to plan the two separately. Before you can plan where to deploy the operations it is important you have a good understanding of what the operations can test. IP SLA Manager 3.0 can perform the following operations:

DNS

FTP

HTTP

DHCP

TCP Connect

UDP Jitter

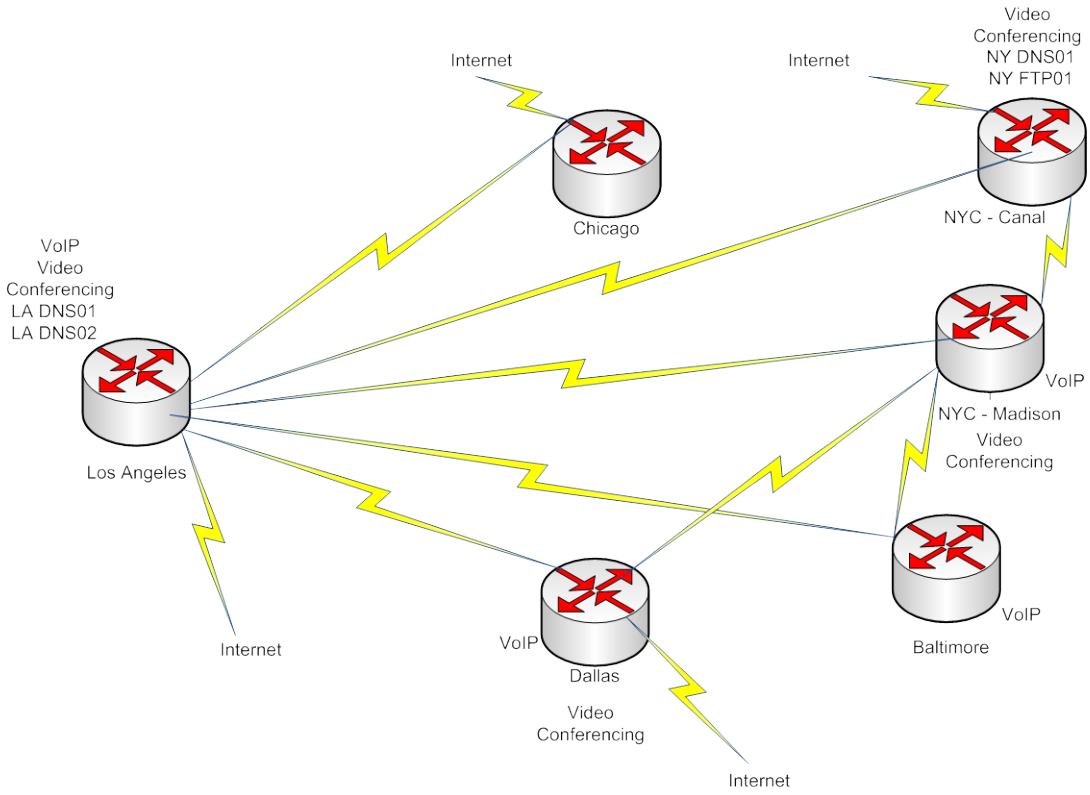
VoIP UDP Jitter

ICMP Echo

UDP Echo

Note: For the detailed measurement metrics for each test type perform a web search on "Cisco IOS IP SLAs Configuration Guide, Release 12.4"

For the purpose of this paper we will use the following network.



Path Test Plan

After examining your network services, links protocols, and edge routers, you may come up with a table similar to this. The emphasis here is on what services are expected to be carried from WAN router to WAN router (a *WAN path*) and the expected quality of that path.

WAN Path Supported Services

Service	Locations	Expected Service Level
Video Conferencing over UDP 2000	NY Madison, NY Canal, Los Angeles, Dallas	No disconnects, limited audio and visual distortions, available 24X7, jitter < 30ms, delay < 150ms
Inter-Site IP connectivity	NY Madison, NY Canal, Los Angeles, Dallas, Chicago, Baltimore	Delay < 400ms
Inter-Site TCP connectivity	NY Madison, NY Canal, Los Angeles, Dallas, Chicago, Baltimore	Delay < 400ms
VoIP	NY Madison, Los Angeles, Dallas, Baltimore	MOS > 3.4

Point Test Plan

Next we should examine what *point services* the network is expected to support. Point services test the availability of a service without regard to a specific path. A point service table may look something like this.

Point Services

Service	Location of requestors	Location of service	Expected Service Levels
DNS resolution	NY Madison, NY Canal	NY DNS01	100% resolution
DNS resolution	Chicago	LA DNS01, LA DNS02	100% resolution
DNS resolution	Baltimore	LA DNS01, LA DNS02	100% resolution
DNS resolution	Dallas	LA DNS01, LA DNS02	100% resolution
DNS resolution	Los Angeles	LA DNS01, LA DNS02	100% resolution
Salesforce access	NY Madison, Dallas, Los Angeles	http://www.salesforce.com	24X7 access
Netsuite access	Chicago	https://system.netsuite.com/pages/customerlogin.jsp?country=US	24X7 access
On line price file via FTP (3MB)	NY Madison, Dallas, Los Angeles	NY FTP 01	Ability to retrieve update file salessku.txt. File updated about once an hour. Update takes about 5 min and file is unavailable during update

Phase 2 – Design

With a high-level understanding of what services need to be provided and what the expectations for these service are, we can begin designing our IP SLA testing. A successful design should verify:

Test coverage – Are all expected services being tested across all applicable paths?

Test frequency – Is the testing frequency appropriate for the service under test?

Network impact – Will the test have a negative impact on network devices or links?

Using the previously created planning tables above, we can create an implementation plan.

Path Operations

Test	Point A	Edge Device	Point B	Edge Device	Protocol (port)	Operation(s)	Frequency
Video quality	Dallas Bld 1	Dal2811-1	LA Tower Room 32	LA2811	UDP (2000)	UDP Jitter Dal/LA	300s
Video quality	Dallas Bld 1	Dal2811-1	NY Madison	NY-Mad 7204	UDP (2000)	UDP Jitter Dal/NYMad	300s
Video quality	Dallas Bld 1	Dal2811-1	NY Canal	NY-Can 7201	UDP (2000)	UDP Jitter Dal/NYCan	300s
Video quality	LA Tower Room 32	LA2811	NY Madison	NY-Mad 7204	UDP (2000)	UDP Jitter LA/NYMad	300s
Video quality	LA Tower Room 32	LA2811	NY Canal	NY-Can 7201	UDP (2000)	UDP Jitter Dal/NYCan	300s
Video quality	NY Canal	NY-Can 7201	NY Madison	NY-Mad 7204	UDP (2000)	UDP Jitter NYCan/NYMad	300s
Inter-site IP Delay	Each	LA2811, NY Can 7210, NY Mad 7204, CHI 2600, DAL 2811, BAL 2600	All directly connected	All directly connected	IP	ICPM Echo	300s
Inter-site TCP Delay	Each	LA2811, NY Can 7210, NY Mad 7204, CHI 2600, DAL 2811, BAL 2600	All directly connected	All directly connected	TCP	TCP Connect	300s
VoIP Quality	Los Angeles	LA2811	NY MAD	NY-Mad 7204	UDP	UDP VoIP	300s
VoIP Quality	Los Angeles	LA2811	Baltimore	BAL 2600	UDP	UDP VoIP	300s
VoIP Quality	Los Angeles	LA2811	Dallas	DAL2811-1	UDP	UDP VoIP	300s
VoIP Quality	NY Madison	NY-Mad 7204	Dallas	DAL2811-1	UDP	UDP VoIP	300s
VoIP Quality	NY Madison	NY-Mad 7204	Baltimore	BAL 2622	UDP	UDP VoIP	300s

We now have a collection of 24 individual IP SLA Operations with which to test the network for VoIP quality, video quality, as well as TCP and IP connectivity, and delay throughout. Now we'll examine how to determine if we have met the criteria for test coverage, test frequency and network impact.

Test Coverage

I have found the easiest way to assure coverage is to use the network map and mark links with the operations listed in the above table. For a large or complicated network you might choose to mark the operations on the map with a simple code and insert a key table for the codes. This is a good way to visualize the test coverage, and any gaps in coverage will become apparent quickly. It also shows the relationship between the services at each location, the associated equipment and links involved with the services and the operations.

Test Frequency

For most IP SLA operations 300 seconds is a reasonable interval for testing services that are considered stable. If a service becomes unstable or service quality diminishes, it may be best to increase the test frequency temporarily, keeping in mind that over testing a struggling service may worsen the quality of the service.

Network Impact

The above table has 24 operations spread over the network with the LA2811 device having 8 operations. Assuming the connections between the locations have ample bandwidth and the devices have sufficient memory and CPU, these operations will have very little impact on the network. This can be verified by comparing Orion NPM statistics before and after operations are deployed.

Before applying operations you should check Orion NPM for congested links or IP SLA source devices with abnormally high CPU or memory usage.

Now we'll do the same for the *point operations.*

Point Operations

Service	User Location	Edge Device	Service Point	Operation(s)	Frequency
DNS	NY Madison	MAD 7204	NY DNS01	DNS	300s
DNS	NY Canal	CAN 7201	NY DNS01	DNS	300s
DNS	Dallas	DAL2811-1	LA DNS 01, LA DNS02	DNS	300s
DNS	Baltimore	BAL2600	LA DNS 01, LA DNS02	DNS	300s
DNS	Los Angeles	LA2811	LA DNS 01, LA DNS02	DNS	300s
DNS	Chicago	CHI2600	LA DNS 01, LA DNS02	DNS	300s
Salesforce	NY Madison	MAD7204	http://www.salesforce.com	HTTP	300s
Salesforce	Dallas	DAL2811-1	http://www.salesforce.com	HTTP	300s
Salesforce	Los Angeles	LA2811	http://www.salesforce.com	HTTP	300s
Netsuite	Chicago	CHI2600	https://system.netsuite.com/pages/customerlogin.jsp?country=US	HTTP	300s
Price file access	NY Madison	NY-Mad 7204	ftp://sales:salespass@ftp.saleshost.com/salesku.txt	FTP	1800s

Test Coverage

Because point operations are not path specific it is easier to verify coverage. Simply checking the operations list above against the point services list from the planning phase will suffice.

Test Frequency

Again, for most IP SLA operations 300 seconds is a reasonable interval for testing services that are considered stable. There is one noticeable exception to the 300 second interval, the FTP operation. The FTP operation actually makes an FTP request for the target file and records the file size and how long it took to receive the file. When the file is being updated, which takes about 5 minutes, it is unreachable, so testing every 5 minutes will result in false alerts. Also if the file is large, the network will be adversely impacted by frequent tests.

Network Impact

With the minimal number of overall tests and the reduction in FTP test frequency, we can expect no impact on the network or individual devices due to IP SLA operations.

Phase 3 – Implementation

A successful implementation is fairly easy if the planning and design phases have been done with care. Here are some tips that will help:

Use the design lists as check lists. Check off operations as you create them to ensure complete implementation.

Use the topology assignments where possible but be aware that assigning operations in a full mesh topology will result in *N*(*N*-1) operation where *N* is the number of test nodes. So full mesh testing of UDP jitter for a 45 site network will create 1980 operations! If these are being deployed to test the video conferencing at 8 sites, choose “Custom” instead of full mesh and test only for the video sites.

You will be implementing one operation type at a time, but IP SLA Manager allows you to choose multiple sources and multiple targets when implementing operations.

If you are unsure about the impact operations are having on the network or particular devices, pause and check NPM for performance of those elements.

Phase 4 – Operation

Operating IP SLA manager is very straight forward. The “IP SLA Manager Settings” button is available in the upper right corner of the IP SLA Manager Summary view. This provides a quick way to access the IP SLA Manager Wizard to add, remove or edit operations.

Please see the *IP SLA Manager Administrator Guide* for a complete description of operations.

Phase 5 – Optimization

This phase is sometimes called the *loopback phase.* After IP SLA Manager has been running for a time, optimization can begin. The goal of this phase is to provide constant improvement for IP SLA testing. The following should be reviewed as part of a regular optimization review:

Coverage – Are all required services being tested on all required paths? A network is always changing so you can expect the coverage requirements to change as well.

False positives or false alerts - Are the test yielding false positive results for warning, critical, or failures? Improper test frequencies or improperly placed tests can cause test results to be inaccurate.

Unrealistic results - If you are performing a UDP jitter test across continents and the results are always 2ms delay and 0ms jitter, these are not realistic results. The operation should be examined for a incorrect target or the like.

Summary

The following points will help to make your transition from Orion VoIP Monitor to IP SLA manager successful:

Use the PDIOO methodology to structure this effort.

Start with careful planning, gather all the data you can on the services you will be testing and what the goals of those services are.

Create planning sheets for path operations and point operations.

Use the information from the planning phase to create design sheets ensuring proper coverage and minimal network and device load.

Make use of the design plans during implementation. The design plans can work as check sheets for implementation.

Periodically review the results and determine where operations should be added, removed, or edited.

About SolarWinds

SolarWinds is rewriting the rules for how companies manage their networks. Guided by a global community of network engineers, SolarWinds develops simple and powerful software for managing networks, small or large. Our company culture is defined by passion for innovation and a philosophy that network management can be simplified for every environment.

SolarWinds products are used by more than one million network engineers to manage IT environments ranging from ten to tens of thousands of network devices. Comprised of fault and performance management products, configuration and compliance products, and tools for engineers, the SolarWinds product family is trusted by organizations around the globe to design, build, maintain, and troubleshoot complex network environments.

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