Cisco Service Path Analyzer 1.0

Product Overview

Cisco® Service Path Analyzer (SPA) provides visibility into the actual service path of individual applications and services within a network by unobtrusively monitoring and analyzing all routing activities. Operators and network engineers can pinpoint a variety of persistent and transient network problems that are difficult to diagnose, or even invisible, using only traditional management techniques and tools.

Many of these disruptions, such as microfailures, misconfigurations, and lack of redundancy, are transient in nature. Delivery of next-generation services requires a high-fidelity view of network topology and source/destination pairs, called service paths. Cisco SPA delivers a high-fidelity Layer 3 view through continuous monitoring of the IP control plane. By listening to routing protocols and all related activity, Cisco SPA reconstructs the state of the network and its service paths, providing a representation of all Layer 3 components and paths in "network-time," the speed at which events are registered by the network itself.

Applications

Cisco SPA is critical for network environments that deliver real-time services, such as video conferencing, voice-over-IP (VoIP) solutions, trading floors, and so on. Routed IP networks are dynamic systems that automatically reroute traffic to account for the changing state of the network. This dynamic capability of IP is its strength, but poses major challenges when users attempt to understand how services are delivered over the network at a given point in time.

Next-generation applications, such as video, voice, interactive gaming, and capital markets data distribution, place more stringent demands on the infrastructure than traditional Web and e-mail data services carried over IP. These new services require a network-time understanding of service paths to correlate degradation in service quality with infrastructure disruptions. This view provides value to a broad set of users:

- Service owners can use Cisco SPA to quickly isolate the root cause of service degradation and disruptions. Rapid remediation helps ensure a higher-quality service experience to the end user.

- Network operators can proactively detect and isolate the causes of transient network disruptions and address them before users call the help desk. By proactively addressing transient instabilities, operators can also prevent future service quality degradation.

- Network engineers can quickly perform complex diagnosis and isolation of network instabilities, allowing them to shrink mean time-to-repair (MTTR) which, in turn, reduces operating costs.

- Network planners can use Cisco SPA trending and statistics to help ensure optimal network operation.

Capabilities

Network-time, high-fidelity view of network and paths: Listening to all routing protocol messages allows Cisco SPA to derive and display a real-time graphical view of both the Layer 3 topology and the paths between selected source/destination pairs (Figure 1). This capability is completely nondisruptive to ongoing network operation and imposes no burden on routers or other network elements—in sharp contrast to Simple Network Management Protocol (SNMP)–based solutions that employ polling to extract data from network elements, placing loads on routers and impairing their performance.

Figure 1.   Cisco SPA Topology View
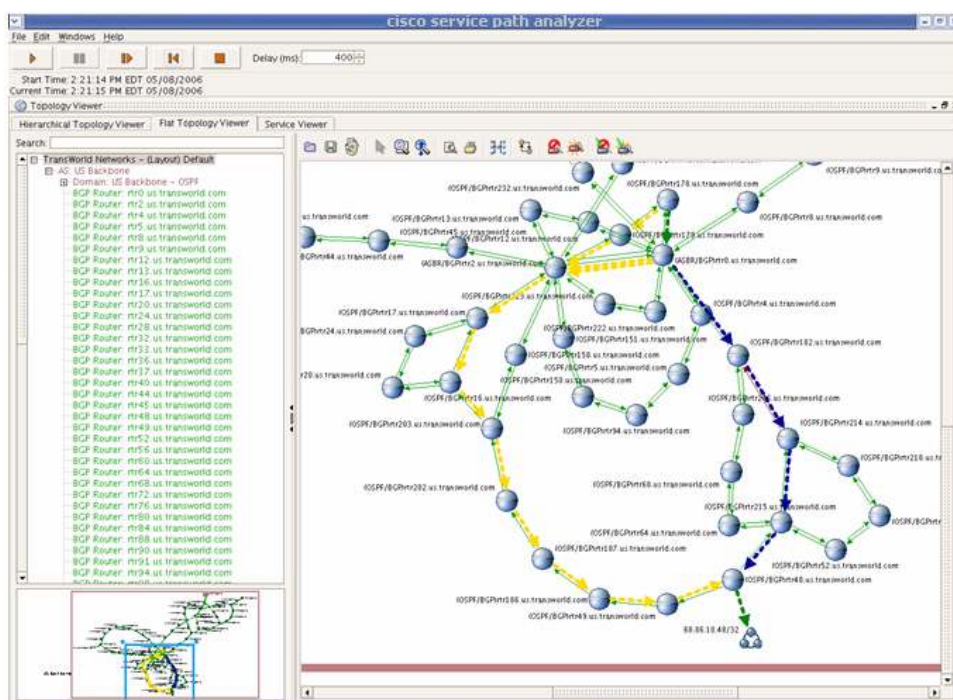
Proactive and forensic analysis of IP network problems: Cisco SPA helps enable service owners, network engineers, and operators to diagnose and resolve problems much more rapidly than previously possible. A survey of trouble tickets and their resolution times indicates that in complex network environments, 80 percent of time to fix is spent in isolating the problem and determining the root cause. Cisco SPA dramatically reduces this time by simplifying the diagnosis of problems related to the IP layer. In particular, Cisco SPA offers:

- Detection and isolation of routing problems not found through conventional tools
- Root-cause determination of service path disruptions
- Comparison of the as-running with the as-configured state to detect misconfiguration issues

Customizable alerts and reports: Cisco SPA offers a comprehensive set of reports and alarms, many of them configurable by the network operator. For example:

- Detailed reports on availability, routing operation, and network stability, which can be summarized on a regular basis and used as the basis for determining overall network operation.

- Comprehensive alarms providing real-time notification directly to personnel or to other systems, including changes in link state or metrics, temporary loss of connectivity or redundancy and their impact on critical services.

Interface to third-party systems: Cisco SPA easily interfaces with fault and network management and other third-party systems and fits seamlessly into existing operational environments with little need for changes to established methods and procedures.

Simple installation and configuration: Cisco SPA is easily deployed using network appliances fully compliant with stringent carrier and enterprise management and security standards along with a PC-based management console. The appliances are:

- **Listeners:** One rack-mount unit (1U) appliances that host the data collection software of the Cisco SPA platform.
- **Servers:** Two rack-mount unit (2U) appliances with RAID 5, redundant power-supply units (PSUs), and significant processing power to host the analytics/diagnostic software and database.
- **Management console:** A Java-based thick-client GUI runs as a PC application to communicate with the server appliance and facilitate high-quality display and manipulation of visually rendered data. Multiple management consoles can operate against a single server.

A typical deployment may have a couple of listeners and a single server. The distributed design of the system delivers scalability and resistance to failure.

Features

Track down transient failures that are not visible to other systems. A recent survey of customer trouble tickets found that for every failure longer than 5 minutes detected by SNMP systems, there were 10 times as many transient failures that are shorter and often undetected by today's systems. Transient failures were of little consequence for traditional data services but could degrade the quality of real-time IP applications such as voice. Cisco SPA helps enable network operators to detect and address these types of transient failures.

Rapidly identify logical errors that are unseen by other systems. Logical errors with major (that is, networkwide) impact are captured in real time and (optionally) alarmed on; such errors include:

- Announcement/withdrawal of routes
- Improper default route provisioning
- Black-hole routes
- Over-/undersummarization of address space
- Faulty configurations
- Incorrect metric changes
- Route leaking
- Redundancy/equal-cost-multipath failures
- Duplicate IP addressing

Provide accelerated root cause analysis for outages and suggest remedial actions. Cisco SPA can store and replay historical events helping enable engineers to "rewind" the state of the network and replay network events. This capability assists service and network operations personnel in uncovering problems and establishing correlations with extrinsic events to identify the root cause of past service disruptions. The result: A dramatic reduction in the time to fix many Layer 3 problems.

Business Benefits

- Maximize customer satisfaction by increasing service availability. Cisco SPA reduces the service disruptions and increases the quality of service through its ability to see the network as the network sees itself.

- Cut operating costs by improving productivity of human and network resources. Cisco SPA trims down the cost of day-to-day operations by helping enable staff to pinpoint potential service issues through vastly reduced diagnosis time and predictive root-cause analysis.

- Roll out new services faster by collecting information instrumental in determining network readiness prior to initiation. Cisco SPA provides organizations with data before the actual traffic flows, offering visibility to the stability of the network and whether it will permit the desired service level. Launching new products and services on time and meeting customer expectations can drastically affect your new product revenues and customer loyalty.

- Realize higher productivity from complementary Cisco applications, such as Cisco Info Center, CiscoWorks, and Cisco Active Network Abstraction, by providing invaluable network intelligence as inputs for these assets.

- Boost return of previous investments by enhancing existing infrastructure and applications. Cisco SPA feeds real-time information to existing fault, performance, and network management solutions, such as Cisco Info Center, IBM Tivoli, HP OpenView, HP TeMIP, EMC Smarts, CA Spectrum, and others. Cisco SPA helps enable these products to meet the challenges and demands of converged networks and real-time applications.

- Achieve rapid return of investment through rapid deployment, ease of use, and low training costs. Off-the-shelf Cisco SPA servers and listeners can be installed swiftly—and will immediately begin providing information about a wide range of IP network sources.

- Future-proof investments by offering a highly scalable architecture. The ground-breaking three-tier architecture permits Cisco SPA to grow with the increasing demands of your organization.

Feature Summary

Table 1 summarizes the features of Cisco SPA.

Table 1.   Feature Summary

Feature	Details and Benefit
Network-time, high-fidelity view of network topology	"Air-traffic control" view of the network topology, updated at network speed as changes occur in the network
	Detailed routing information (name, links, addresses, link status, metrics, prefixes, and so on) centralized in a single, easily navigable view—all accessible without direct router access
Service monitoring	Real-time and historical visualization and tracking of service paths, either individually or as a group (referred to as "services") through the network
Network-time routing protocol data collection	Collectors for major routing protocols: Open Shortest Path First (OSPF), Border Gateway Protocol (BGP)/Multiprocol BGP (MP-BGP)

Static multicast	Visualization and monitoring of SM and SSM multicast paths (trees), both real-time and historical
Static routes and next-hop resolution	Configuration of static routes and next hops enables accurate path computation, visualization, and monitoring for service paths and bound routers
Monitoring and alerting	Tracking of events and logical faults, such as connectivity loss, service path deviation, duplicate IP addresses, and so on, which can all be exported as logs or alarms through syslog or as SNMP traps
Historical replay	Storage of events for forensic analysis and fault investigation, which can be played back in detail by event. Existing service paths can be applied, or new ones can be provisioned, on demand, to analyze how a particular application (or set of applications) was behaving at a specific point in time.
Routing analysis	Visualization of all routers, links, adjacencies, and peering relationships
	Tabular display of all routers, routes, interfaces, metrics, and path attributes
	Layer 3 root-cause analysis across multiple routing protocols
	Network convergence time tracking across areas
	Real-time event logging by protocol
Customizable reports and charts	Reporting on route/router availability and redundancy, network churn, link flapping by route/router, metric changes, historical network activity by router, and service path compliance by hotspot analysis, availability, and behavior by protocol or service

Product Specifications

Table 2 lists the hardware specifications for Cisco SPA. Table 3 lists the listener hardware requirements.

Table 2. Cisco SPA Server Hardware

Processor	
Processor (CPU)	X86 architecture CPU
Processors installed	2
Basic input/output system (BIOS) type	Flash memory
Memory	
Memory installed	16 GB
Hard Disk	
Hard disks installed	4
Hard disk interface type	Serial Attached SCSI (SAS)
Mean time between failure (MTBF) of hard drives	1.0 Mhours (40C)
Power-on hours	24 hours/7 days a week (70–80 percent duty cycle)
RAID configuration	• Hardware RAID through integrated Intel hardware RAID controller • Battery backed write cache—configurable to 512 MB • Software RAID 5
Hot swappable	Yes
Optical Storage	
DVD-ROM	8X DVD read, 24X CD read
Interfaces	
Ethernet	2 x 10/100/1000 RJ-45 interfaces (2 more)
Serial ports	1
USB 2.0 ports	3 (1 at front and 2 at back of chassis)
Power	
Maximum power consumption	• 980W (maximum input, power supply rating) • 600W (maximum output, power supply rating)
Autoranging AC input	Yes

Power Factor Correction (PFC)	Yes
Input low range	100 to 120 (nominal) VAC; 50–60 Hz
Input high range	200 to 240 (nominal) VAC; 50–60 Hz
Redundant power supply	Yes
Input kilovolt-amperes (kVA) approximately	Maximum configuration 0.290 kVA
Environmental	
Air temperature—Server on	50 to 95°F (10 to 35°C)
Air temperature—Server off	−40 to 158°F (−40 to 70°C)
Humidity	Server off: 95 percent, noncondensing at +35°C
Cooling system	• 6 fans installed (four are in the power supplies) • 2 blowers installed
Dimensions	
Form factor	• 2 rack-mount units
Rack mounting	• 2-post, 4-post rack mounting options available
Weight	• 35.0 lb (15.8 kg), base chassis
Height	• 3.4 in. (8.8 cm)
Width	• 17.0 in. (432 mm)
Depth	• 20.0 in. (508 mm) without bezel or mounting hardware

Table 3. Cisco SPA Listener Hardware

Processor	
Processor (CPU)	X86 architecture CPU
Processors installed	1
Basic input/output system (BIOS) type	Flash memory
Memory	
Memory installed	4 GB
Hard Disk	
Hard disks installed	2
Hard disk interface type	Serial-ATA
MTBF of hard drives	1.0 Mhours (40C)
Power-on hours	24 hours/7 days a week (70–80 percent duty cycle)
Optical Storage	
DVD-ROM	1 front accessible (8X DVD read, 24X CD read)
Interfaces	
Ethernet	2 x 10/100/1000 RJ-45 interfaces (additional 2 are optional)
Fiber (optional)	2 x 1000 Fiber interfaces (optional instead of additional Ethernet)
Serial ports	1
USB 2.0 ports	3 (1 at front and 2 at back of chassis)
Power	
Maximum power consumption	• 540W (maximum input, power supply rating) • 350W (maximum output, power supply rating)
Autoranging AC input	Yes
PFC	Yes
Input low range	100 to 120 (nominal) VAC; 50–60 Hz
Input high range	200 to 240 (nominal) VAC; 50–60 Hz

Input kilovolt-amperes (kVA) approximately	Maximum configuration 0.290 kVA
Environmental	
Air temperature—Server on	50 to 95°F (10 to 35°C)
Air temperature—Server off	−104 to 158°F (−40 to 70°C)
Humidity	Server off: 95 percent, noncondensing at +35°C
Cooling system	• 3 fans installed (two are in the power supply) • 2 blowers installed
Dimensions	
Form factor	1 rack-mount unit
Rack mounting	2-post, 4-post rack mounting options available
Weight	15.0 lb (6.8 kg), base chassis
Height	1.7 in. (43 mm)
Width	17.0 in. (432 mm)
Depth	20.0 in. (508 mm) without bezel or mounting hardware

Ordering Information

For more information on Cisco Service Path Analyzer 1.0 and ordering details, please contact your local Cisco account representative or send an e-mail to the product marketing group at ask-cspa@cisco.com.

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 Cisco Service Path Analyzer 1.0, visit http://www.cisco.com/go/cspa, contact your local Cisco account representative, or send an e-mail to the product marketing group at ask-cspa@cisco.com.

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