DEPLOYING SILVER PEAK NX SERIES APPLIANCES IN ENTERPRISE NETWORKS

INTRODUCTION

Silver Peak NX Series appliances are designed to fit seamlessly into any distributed enterprise network. They require a minimal amount of network configuration and absolutely no client, server, or application reconfiguration, providing an order-of-magnitude improvement in application delivery with minimal upfront time and effort.

Silver Peak appliances are deployed in each office of a distributed enterprise network and typically sit "behind" the Wide Area network (WAN) router. The appliances support a variety of different installation modes and robust fallback mechanisms, making them a perfect fit for all enterprise situations.

Figure 1 depicts Silver Peak NX Series appliances deployed in an example enterprise network with three distributed offices – a Headquarters building and two branch offices.

The Silver Peak appliances in the two branch offices are connected to the appliance in Headquarters by tunnels that ride over any existing WAN infrastructure.

Tunnels are extremely important to the Silver Peak solution as they are the primary means by which Silver Peak appliances communicate with one another. The appliances use the tunnels to distribute control information and to drastically improve office-to-office communications for all enterprise networking applications and protocols. Silver Peak tunnels are implemented using standards-based

Generic Routing Encapsulation (GRE) or Internet Protocol Security (IPSec). This enables the Silver Peak solution to leverage existing network resources and infrastructure, while also providing a secure way for data to traverse the WAN.

DEPLOYMENT MODELS

There are several ways to setup Silver Peak NX Series appliances at an enterprise location. In-line deployment is the simplest deployment option, requires the least amount of configuration, and is best suited for branch or remote office deployments. Out-of-path installation is slightly more robust and has the benefit of supporting a more varied set of failure recovery mechanisms. The out-of-path deployment options require reconfiguration of existing

WAN router(s) to redirect traffic to the Silver Peak appliance.

It is important to realize that the same deployment model is not required at every location. The decision will be based on a variety of factors, including the availability of network resources at a given site, familiarity and comfort level with existing networking equipment, and, of course, the failure recovery method that is preferred.

The balance of this document will give an overview of each deployment option and will discuss what network resources are required. Please refer to Silver Peak product documentation for complete installation instructions. When prepared, a typical deployment takes 30 minutes or less per appliance.
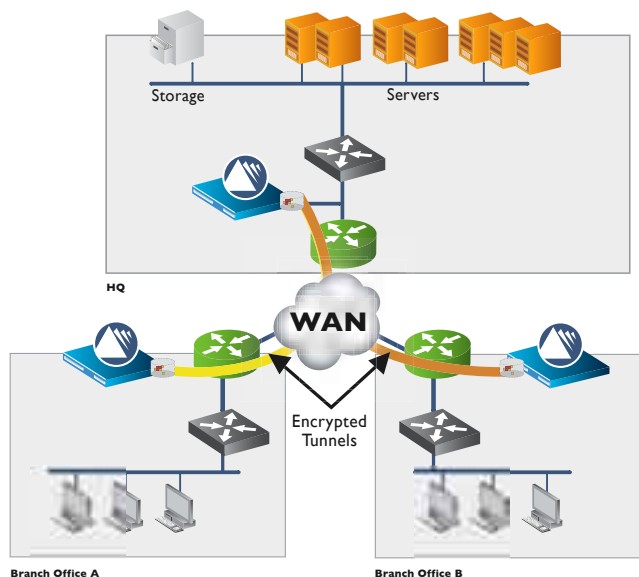

Figure 1 Silver Peak Appliances Deployed in an Example Network with Three Offices

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IN-LINE

In an in-line deployment the Silver Peak appliance is inserted in-line between the WAN router and the Ethernet switch on the LAN side of the network (see Figure 2). In this mode, the appliance intercepts all packets destined for the WAN. The appliance accelerates traffic flows that match its Access Control Lists (ACLs); all other traffic passes through the appliance unmodified.

To install the appliance in this mode:
1. Disconnect the Ethernet Local Area Network (LAN) switch from the WAN router
2. Connect the LAN interface of the appliance (see Appendix A for a description of the interfaces on the NX Appliance) to the Ethernet LAN switch
3. Connect the WAN interface of the appliance to the WAN router
4. No Ethernet LAN switch or WAN router configuration modification is required

In the unlikely event that the appliance fails, the appliance will behave simply as a straight wire connecting the Ethernet LAN switch directly to the WAN router and traffic will continue to flow uninterrupted. It is important to note that, for this failure recovery method to function correctly, the Ethernet LAN switch and WAN router must have compatible Ethernet interface physical configuration settings (speed and duplex).
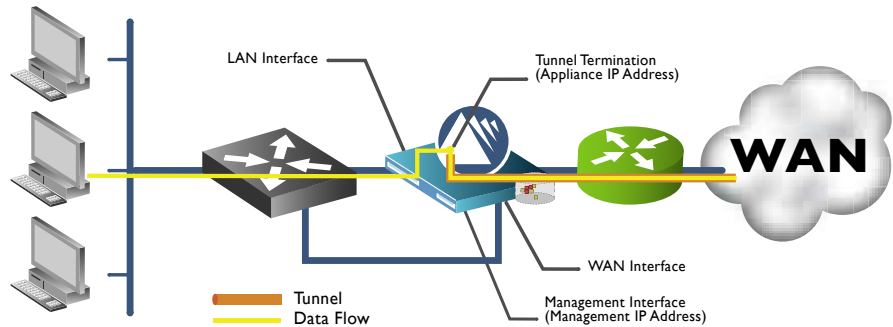

Figure 2 In-Line Deployment of Silver Peak Appliance

SUMMARY	
Appliance Placement	Appliance placed in-line between Ethernet LAN switch and WAN Router • Appliance LAN interface connects to Ethernet LAN switch • Appliance WAN interface connects to WAN router
Fail-Safe Behavior	Fails-To-Wire: The appliance behaves as straight wire between the Ethernet LAN switch and the WAN router in any failure scenario (hardware, software, power) IMPORTANT: Ensure that the Ethernet LAN switch and the WAN router have compatible Ethernet interface physical configuration settings (speed and duplex settings). This is to ensure that traffic flows correctly if the Silver Peak appliance "Fails-to-wire"
IP Addresses	This deployment model requires two IP addresses (on the same or separate subnets) • Silver Peak Appliance IP Address (to originate and terminate tunnel) • Silver Peak Management IP Address (for appliance configuration and management)

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OUT-OF-PATH WITH POLICY-BASED ROUTING REDIRECTION AND FAILURE RECOVERY

In an out-of-path deployment, the Silver Peak appliance is not in the direct path of the network traffic. As a result, a network traffic redirection technique is used to forward traffic to the appliance.

If a spare interface is available on the WAN router, Policy-Based-Routing (PBR) redirection can be used to send traffic to the Silver Peak appliance. Policy Based Routing is a common technique to redirect flows of traffic using an ACL and a policy instead of normal routing table lookups. Figure 3 shows a Silver Peak appliance installed in out-of-path mode with Policy-Based Routing redirection and

failure recovery. In this mode, the appliance intercepts only those packets that have been redirected to it. The appliance accelerates traffic flows that match its Access Control Lists (ACLs); all other traffic passes through the appliance unmodified.

To install the appliance in this mode:
1. Connect the WAN interface of the appliance to the WAN router's available port
2. Do NOT connect the LAN interface of the appliance
3. Configure a PBR on the WAN router to redirect all traffic to be accelerated to the Silver Peak Appliance IP Address

In the unlikely event that the appliance fails, the appliance will behave as open port and will not present a link-level carrier to the WAN router. The WAN router will recognize that the link associated with the PBR is down and will resume forwarding traffic normally according to its routing tables.
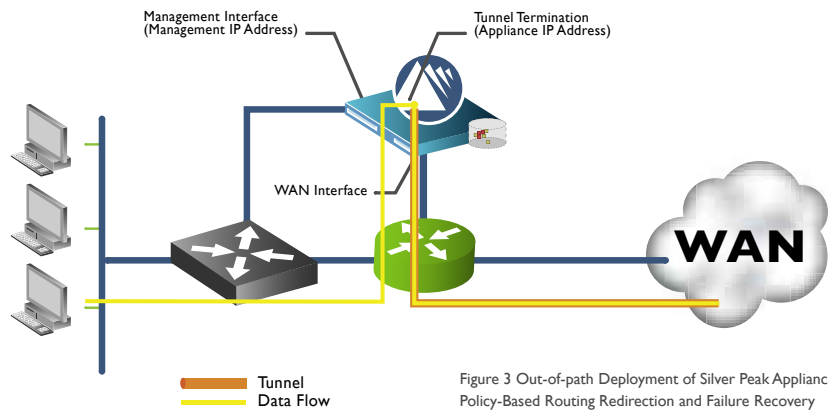

Figure 3 Out-of-path Deployment of Silver Peak Appliance with Policy-Based Routing Redirection and Failure Recovery

> **SUMMARY**

Appliance Placement	Appliance attached to available router interface • Appliance WAN interface connects to available WAN interface • Do not connect LAN interface
Fail-Safe Behavior	Fails-Open: The appliance behaves as an unconnected port in all failure cases (hardware, software, power) • The WAN router sees the link to the appliance go down, Policy Based Routing fails, unicast routing forwards traffic normally
IP Addresses	This deployment model requires two IP addresses (on separate subnets) • Silver Peak Appliance IP Address (to originate and terminate tunnel) • Silver Peak Management IP Address (for appliance configuration and management) Configure PBR on WAN router • Direct traffic from LAN (subnet/interface) destined for WAN to Silver Peak Appliance • Do NOT enable this PBR on the interface to which the Silver Peak Appliance connects

OUT-OF-PATH WITH VRRP PEERING TO WAN ROUTER

In this scenario, like the last, the Silver Peak appliances are not connected in the direct path of the network traffic. As a result, a network traffic redirection technique is used to forward traffic to the appliance in this scenario, as well.

If a spare interface is not available on the WAN router, then Policy Based Routing (PBR) cannot be used to redirect traffic to the Silver Peak appliance. In this case, the easiest way to direct traffic to the appliance is to make the Silver Peak appliance the default gateway for all the clients and servers on the LAN side of the network. The easiest way to do this (which avoids reconfiguration of the hosts and servers) is to configure the IP Address of the Silver Peak appliance to be the same as the existing default gateway IP address.

The appliance and the existing default gateway network element can share this IP address using Virtual Router Redundancy Protocol (VRRP). Assuming that this is the case and that the WAN router is the default gateway, Figure 4 shows a Silver Peak appliance installed in out-of-path mode with VRRP peering to the WAN router. In this mode, the appliance intercepts all packets destined for the WAN. The appliance accelerates traffic flows that match its Access Control Lists (ACLs); all other traffic passes through the appliance unmodified.

To install the appliance in this mode:
1. Connect the WAN interface of the appliance to interface on the Ethernet LAN switch
2. Do NOT connect the LAN interface of the appliance
3. Configure the WAN router and the Silver Peak appliance to share the LAN network's default gateway IP address using VRRP

In the unlikely event that the appliance fails, the appliance will behave as open port. The WAN router will assume the default gateway Virtual IP address and forward traffic normally.
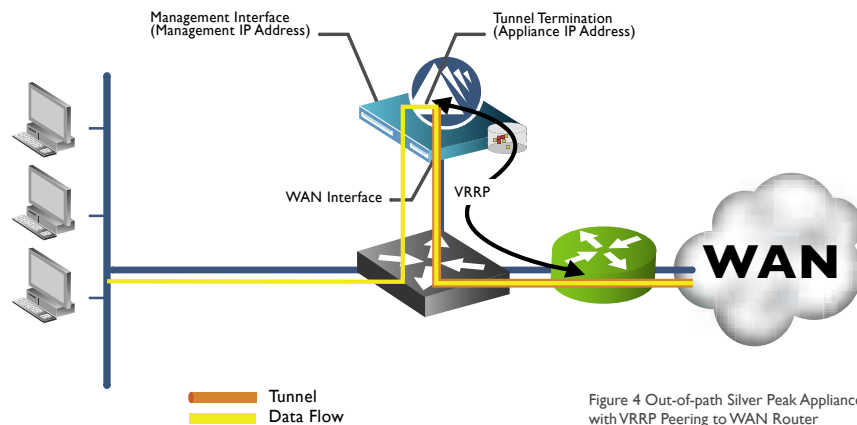

Figure 4 Out-of-path Silver Peak Appliance with VRRP Peering to WAN Router

> **SUMMARY**

Appliance Placement	Appliance shares LAN segment with existing equipment • Appliance WAN interface connects to Ethernet LAN switch • Do not connect LAN interface
Fail-Safe Behavior	Fails-Open • The appliance behaves as unconnected port in all failure cases (hardware, software, power) • WAN router assumes Virtual IP address and forwards traffic normally
IP Addresses	This deployment model requires three IP addresses • Silver Peak Appliance IP Address (to originate and terminate tunnel) • Silver Peak Management IP Address (for appliance configuration and management) • Virtual IP Address (VIP) shared by Silver Peak appliance and the WAN router The VIP must be the default gateway for the clients and servers on the LAN subnet. Note: typically this would be the current default gateway to avoid client reconfigurations The Silver Peak Appliance must share the default gateway VIP with WAN router using VRRP • The Silver Peak Appliance must be configured with higher priority and preemption to ensure VRRP reverts to the appliance

OUT-OF-PATH WITH REDUNDANT SILVER PEAK APPLIANCES

In this scenario, the Silver Peak appliance is connected out of the direct path of the network traffic, and a network traffic redirection technique is required. However, unlike the previous example, redundant Silver Peak appliances are used to ensure that, in the unlikely event of an appliance failure, applications continue to benefit from Silver Peak's advanced application acceleration techniques.

To deploy redundant Silver Peak appliances in an out-of-path configuration, a spare interface must be available on the WAN router (alternatively VLANs can be deployed to achieve a similar logical topology). Policy-Based-Routing (PBR) redirection is used to send traffic to the redundant pair of Silver Peak appliances.

Policy Based Routing is a common technique to redirect flows of traffic using an ACL and a policy, instead of normal routing table lookups. Figure 5 shows two redundant Silver Peak appliances installed out-of-path with Policy-Based Routing redirection. In this mode, the appliances intercept only those packets that have been redirected to them. The appliances accelerate traffic flows that match their Access Control Lists (ACLs); all other traffic passes through the appliances unmodified.

To install a pair of Silver Peak appliances in this mode:
1. Connect the WAN interface of both appliances to the WAN router's available interface
2. Do NOT connect the LAN interface of either appliance
3. Configure the Silver Peak appliances to share a Silver Peak Virtual IP Address via VRRP
4. Configure the WAN router to redirect all traffic to be accelerated to the Silver Peak Appliance IP Address

In the unlikely event that the primary appliance fails, it will behave as an open port. The backup appliance will assume the Silver Peak Appliance Virtual IP address and accelerate traffic.
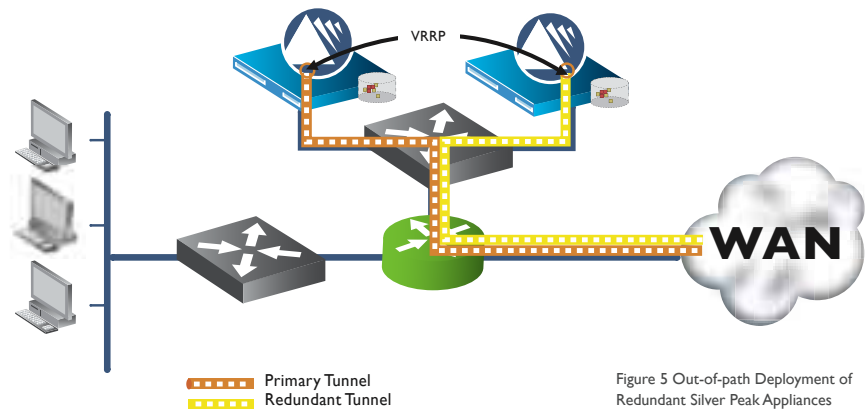

Primary Tunnel
Redundant Tunnel

Figure 5 Out-of-path Deployment of Redundant Silver Peak Appliances

> **SUMMARY**

Appliance Placement	Both appliances are attached to the same available interface via an Ethernet LAN switch
	• Each appliance's WAN interface connects to the Ethernet switch that is connected to the available WAN interface
	• Do not connect LAN interface of either appliance
Fail-Safe Behavior	Fails-Open
	• The failed appliance behaves as unconnected port in all failure cases (hardware, software, power)
	• The backup Silver Peak Appliance assumes the Silver Peak Appliance Virtual IP Address
	• Remote appliances switch to the backup appliance
IP Addresses	This deployment model requires five IP addresses on two separate subnets
	On the first subnet (the subnet of the available router interface)
	• Each appliance needs a Silver Peak Appliance IP Address (to originate and terminate tunnels)
	• The two appliances share one Silver Peak Appliance Virtual IP Address for VRRP
	On the second subnet (the subnet of the LAN clients and servers)
	• Each appliance needs a Silver Peak Management IP Address (for appliance configuration and management)
	Configure PBR on WAN router
	• Direct traffic from LAN (subnet/interface) destined for WAN to Silver Peak Appliances' Virtual IP Address
	• Do NOT enable this PBR on the interface to which the Silver Peak Appliances connect

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CONCLUSION

Silver Peak NX Series appliances are easy to install, operate, and manage. There are several hardware variants and configuration options available that satisfy diverse enterprise deployment needs from branch offices to fully redundant data centers.

Silver Peak delivers a true enterprise-grade solution for branch office infrastructure consolidation. Within minutes, enterprises can reap significant performance benefits that improve application delivery while dramatically reducing the costs of IT operations.

APPENDIX A

Network Interfaces

All Silver Peak appliances have the same set of four 10/100/1000 Mbps Ethernet interfacess available at the rear of the appliance. These interfaces are described in Table 1.

ETHERNET INTERFACE	FUNCTION
LAN	This interface is intended for connection to the LAN side of the network
WAN	This interface is intended for connection to the WAN side of the network
Mgmt0	This interface is intended for network access to the appliance's management interfaces (the Web-based Appliance Manager and the Command Line Interface). It is recommended that this interface is always connected to the network
Mgmt1	This interface is intended for local access to the appliance's management interfaces (the web-based Appliance Manager and the Command Line Interface) with a laptop. This interface should never be connected to the network
	Table 1 Silver Peak Appliance Network Interfaces

Each Silver Peak appliance requires two IP addresses on the network. These IP address are described in Table 2.

IP ADDRESS	FUNCTION
Appliance IP Address	This IP address originates and terminates the tunnels used to interconnect Silver Peak appliances
Management IP Address	This IP address is used for management and configuration of the Silver Peak appliance via the web-based Appliance Manager and Command Line Interface
	Table 2 Silver Peak Appliance IP Addresses

Silver Peak

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