Technical Validation

Maximizing Business Agility with Riverbed SD-WAN

A Holistic Approach to Managing Large and Complex Enterprise IT Networks

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Contents

ESG Technical Validations

The goal of ESG Technical Validations is to educate IT professionals about information technology solutions for companies of all types and sizes. ESG Technical Validations are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objectives are to explore some of the more valuable features and functions of IT solutions, show how they can be used to solve real customer problems, and identify any areas needing improvement. The ESG Validation Team's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments.

Introduction

ESG evaluated the Riverbed SD-WAN solution, a component of Riverbed's Digital Performance Platform, to validate how it enables organizations to manage their increasingly complex IT environments while improving their ability to respond to business needs quickly. The evaluation included Riverbed's ability to unify a disparate IT network—the LAN, corporate Wi-Fi, and WAN connecting data centers, remote offices/branch offices (ROBO), and clouds—leveraging a combination of technologies including SD-WAN (e.g.,path steering, zero-touch provisioning), SD-LAN, cloud connectivity, WAN optimization, enterprise-grade routing, end-to-end management and visibility, and security. ESG sought to validate that the Riverbed SD-WAN solution helps organizations easily connect sites within large, complex enterprise IT networks, apply network traffic and security policies based on business intent, and assure high levels of application performance.

Background

ESG research uncovered that 93% of respondents view their organizations' IT environments as at least equally complex today than two years ago (see Figure 1).[1] Three of the top ten reasons for this complexity that respondents noted were an increase in the number and types of applications used within the organizations, the need to use both data centers and public cloud providers to deliver these applications, and the increase in the number of end-users.[2]

Figure 1. Current View of Complexity of Organization's IT Environment

In general, how complex is your organization's IT environment relative to two years ago?
(Percent of respondents, N=600)
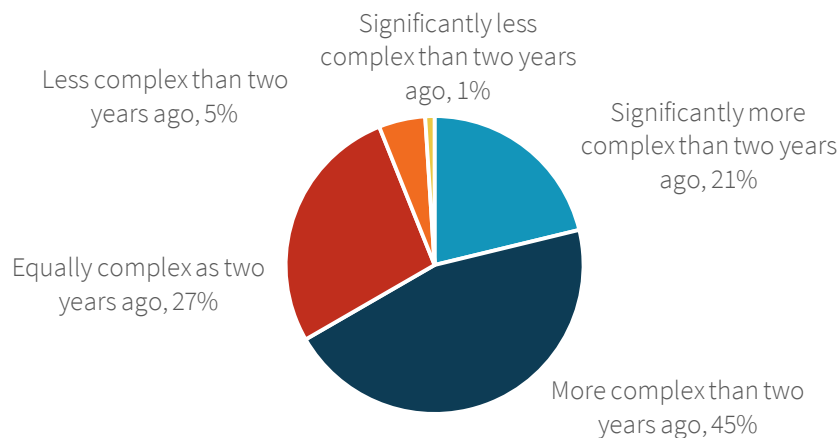
Source: Enterprise Strategy Group

Today, employees can work at geographically dispersed sites and access applications from corporate data centers or infrastructure-as-a-service (IaaS) and software-as-a-service (SaaS) providers. Regardless of office location, organizations must ensure that end-users can access applications and collaborate to meet business needs. In light of complex IT networks, organizations must quickly provide high performance and secure network connections that are highly available, secure, and easy to manage without incurring additional IT costs.

Traditionally, routers have provided network connectivity within organizations' IT networks; however, manually configuring and managing remote routers can be cumbersome and slow, decreasing business agility. Today, organizations are seeking an alternative that takes the complexity out of networking, allowing them to streamline their efforts and focus their valuable time on achieving business objectives.

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[1] Source: ESG Master Survey Results, *2019 Technology Spending Intentions Survey*, March 2019.

[2] ibid.

Riverbed SD-WAN Solution

The Riverbed portfolio is centered on building a Digital Performance Platform that enable organizations to increase business agility and deliver positive digital experiences in large and complex enterprise IT networks. Taking advantage of Riverbed's digital experience management and next-generation infrastructure solutions, Riverbed can provide comprehensive visibility and management of a user's digital experience. Inclusive of the next-generation infrastructure portfolio are Riverbed's SD-WAN and cloud edge solutions.

The Riverbed SD-WAN solution enables organizations to automate and manage secure network connectivity across disparate offices, data centers, and cloud service providers (CSPs) regardless of the underlying network transport (MPLS, IP, Broadband or LTE/wireless). The solution facilitates agile and high-performance application delivery between endpoints—from end-user devices to cloud—via its SD-WAN capabilities.
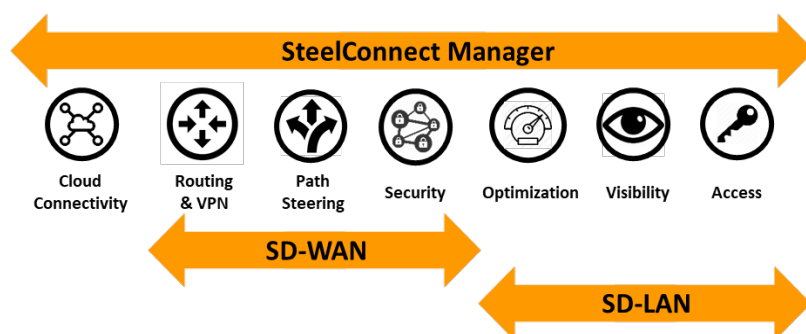
Additional components of the Riverbed SD-WAN solution include gateways for deployment at the branch, data center, and CSPs in both physical and virtual form factors. The solution also offers Wi-Fi access points (via its Xirrus acquisition) to extend its SD-LAN capabilities. Riverbed has integrated both Amazon Web Services (AWS) and Microsoft Azure capabilities into the solution so that organizations can create a multi-cloud environment.

Organizations deploy Riverbed's solution via SteelHead SD, a hardware-based appliance that combines SD-WAN capabilities with enterprise-class routing and security features (such as its native firewall) to optimize application delivery, while providing business policy orchestration and control. For customers that wish to leverage Riverbed's WAN optimization technology, this is an optional add-on via subscription licensing. Riverbed also offers subscription-based pricing for the SD-WAN solution, allowing organizations to add capabilities like WAN Optimization as needed on top of the basic SD-WAN and routing functionality included.

To establish and manage network connections and security policies, organizations use the SteelConnect Manager (SCM). Deployed either on-premises or in the cloud, the SCM helps organizations to deploy and orchestrate business-intent policies on application traffic across the IT network, such as subsets of users, sites, or application types. The SCM enables IT network management and visibility, regardless of whether traffic originates within corporate headquarters, ROBOs, or CSPs. This level of visibility also helps with threat detection and compliance assurance.

The Riverbed solution also automates the integration with Zscaler, a cloud-based proxy and firewall. This automation helps organizations to minimize the time and resources spent on implementing security features within their IT environments such as web filtering, data leakage protection, and advanced threat protection. This is especially useful when an organization's IT environment extends beyond the on-premises network to the cloud. The automation enables the SCM to discover the nearest Zscaler data centers and dynamically choose the Zscaler location to which each organizational site will route traffic so as to minimize latency.

Riverbed also offers other capabilities to secure network traffic when using its SD-WAN solution. Organizations can take advantage of the native firewall, traffic segmentation and filtering capabilities. The solution enables organizations to integrate with third party IP Security (IPsec) VPNs.

ESG Technical Validation

ESG evaluated and tested the Riverbed SD-WAN solution at Riverbed's headquarters in San Francisco, CA. We tested how the solution simplifies network connectivity across an organization's IT environment, centralizes policy management and orchestration, and manages application performance across the IT network. ESG reviewed a number of use cases to showcase how the solution delivers business value. The test bed simulated a fictional organization's global network spanning the United States and Europe, consisting of both IP and MPLS links.

Use Case – Unified Connectivity

Organizations must enable employees to access business applications (originating in the data center or the cloud) and collaborate with each other so that they can quickly respond to business needs. Deploying and configuring routers onsite to connect ROBOs with headquarters and data centers consumes valuable time. Setting up virtual private network (VPN) tunnels between sites and CSPs also requires time and resources. Alternatively, organizations can use the Riverbed SD-WAN solution to simplify the process of connecting offices across the IT network and connecting the on-premises network to CSP platforms.

ESG Testing – Onboarding New Sites

ESG began by setting up a new site to represent an office in Granges, Switzerland added to the network. We navigated to *Network Design*, clicked on *Add Site*, and chose *New Site*. (see Figure 2). We noted the ability to create multiple sites if planning a deployment at scale using the *Bulk site creation* option.

Figure 2. Creating the Granges Site in SteelConnect Manager
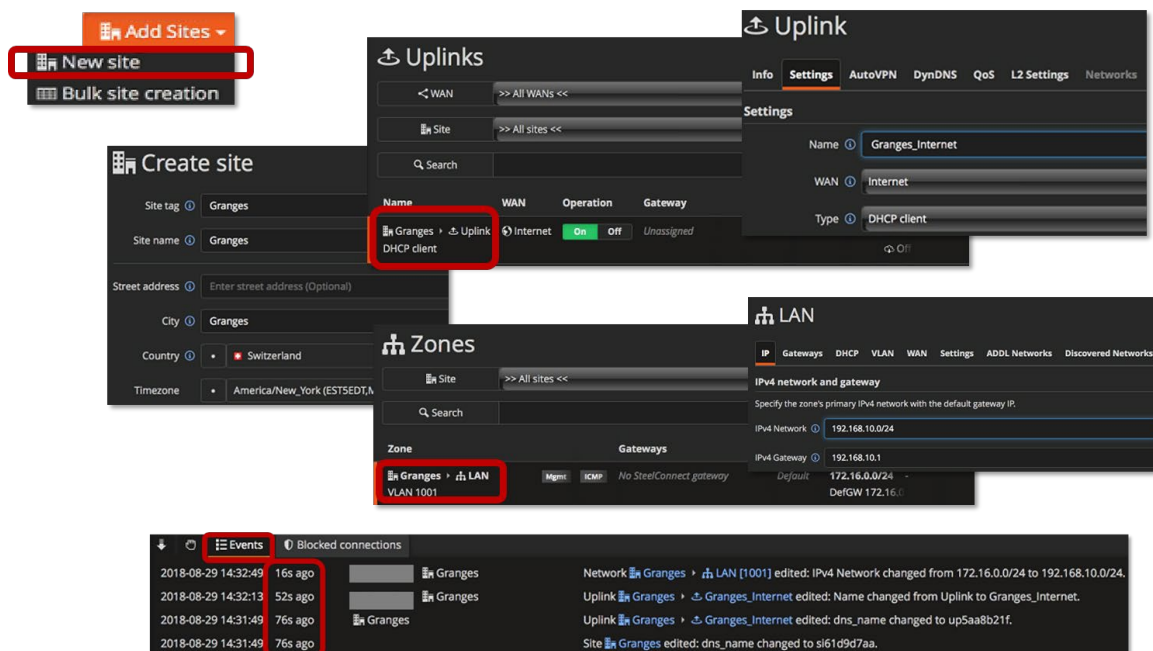
Once the *Create Site* window appeared, we entered the necessary site location information and clicked *Submit*. To define the network connections available at the Granges location, we selected *Uplinks* from the main menu to define the WAN connection and *Zones* for the LAN connection. ESG noted that the SCM confirms all adds and changes at the bottom of the screen via the *Events* window, specifically the short amount of time required to complete these activities.

ESG then configured and deployed a SteelHead SD gateway in Granges. Riverbed follows a principle of "Design First, Deploy Later" to facilitate deployment. Instead of requiring an engineer to manually deploy and configure a hardware device at a ROBO or data center, an IT administrator can create a shadow appliance via the SCM from any location. A shadow appliance represents the physical appliance to be deployed Once the physical gateway is installed at a given site, the administrator can then deploy the shadow appliance's configuration to the device remotely.

ESG proceeded to the *Appliances* menu and clicked on *Overview*, then *Add Appliance* and selected *Create Shadow Appliance* (see Figure 3). We chose both the model (SteelConnect SDI-130) and the site (Granges) in which to deploy the appliance. We then configured the ports on the shadow appliance by navigating to *Ports* under the *Appliances* menu.

Figure 3. Creating and Configuring Shadow Appliance and Deploying Hardware in Granges
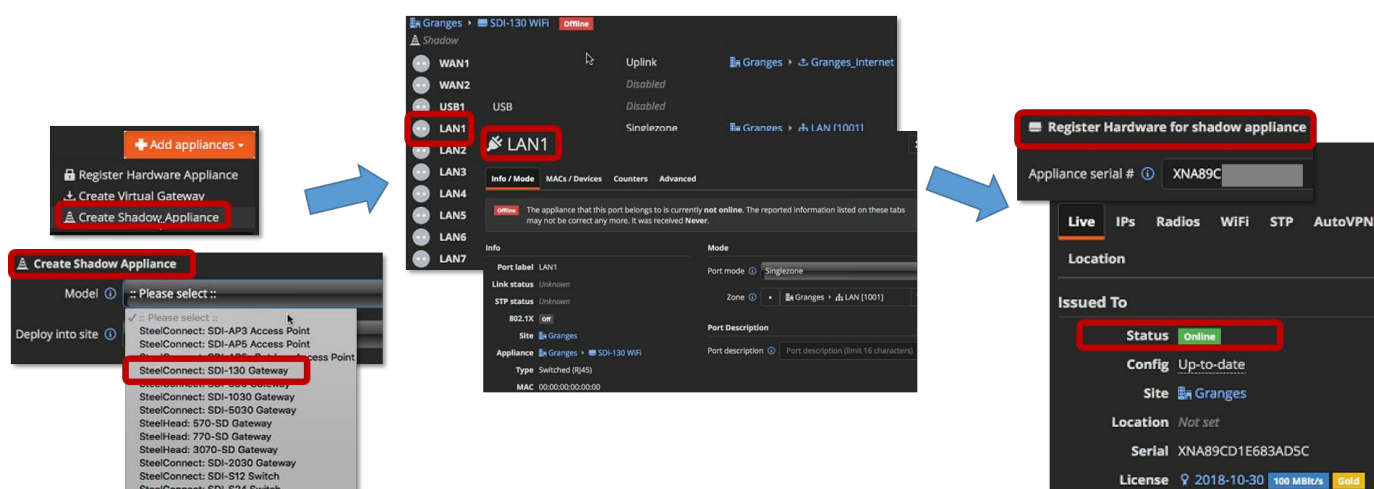
Source: Enterprise Strategy Group

Next, ESG deployed the hardware appliance. Under *Overview* of the *Appliances* menu, we highlighted the "SDI-130" line item and clicked on *Actions*, then *Register Hardware*. We then entered the gateway's device number so that the SCM would configure it with the corresponding shadow appliance's settings. Shortly after deploying the configuration, the SCM brought the device online (shown in the right-hand side of Figure 3).

> **Via this simplified deployment process, the Riverbed solution can help to decrease installation and deployment time, effort, and costs.**

ESG saw how the "Design First, Deploy Later" principle can simplify IT operations. Configuring and installing routers at individual sites consumes time and money, especially when deploying multiple sites at one time. Manual router configuration is also prone to errors as individual ports must be set for specific WAN and LAN connections. Rather than dispatching network engineers to ROBOs and data centers to configure and deploy CE routers, an IT administrator can configure multiple shadow appliances via the SCM before remotely deploying the shadow appliances' configurations to the devices. Installing the gateways only requires local staff, who do not require experience in networking, at these sites to cable these devices for Internet access. Via this simplified deployment process, the Riverbed solution can help to decrease installation and deployment time, effort, and costs. We should also mention that an administrator no longer has to purchase additional MPLS links to connect to new sites, as the Riverbed solution can leverage the existing IP network to establish network connectivity, thus further decreasing costs

ESG Testing – Customer Edge Router Replacement

ESG replaced a customer edge (CE) router with a SteelHead SD in the San Francisco office. We followed a similar workflow described in the previous test case to onboard the site, configure the shadow appliance, and deploy the SteelHead SD. For this use case, we deployed the 770-SD model.

We proceeded to configure the 770-SD such that it connected to the organization's network. We inputted settings via the SCM, mirroring those of the existing CE router in the SFO location (see Figure 4). We configured both LAN and WAN interfaces as well as support for Open Shortest Path First (OSPF).

Figure 4. Configuring SFO Location and Shadow Appliance for 770-SD
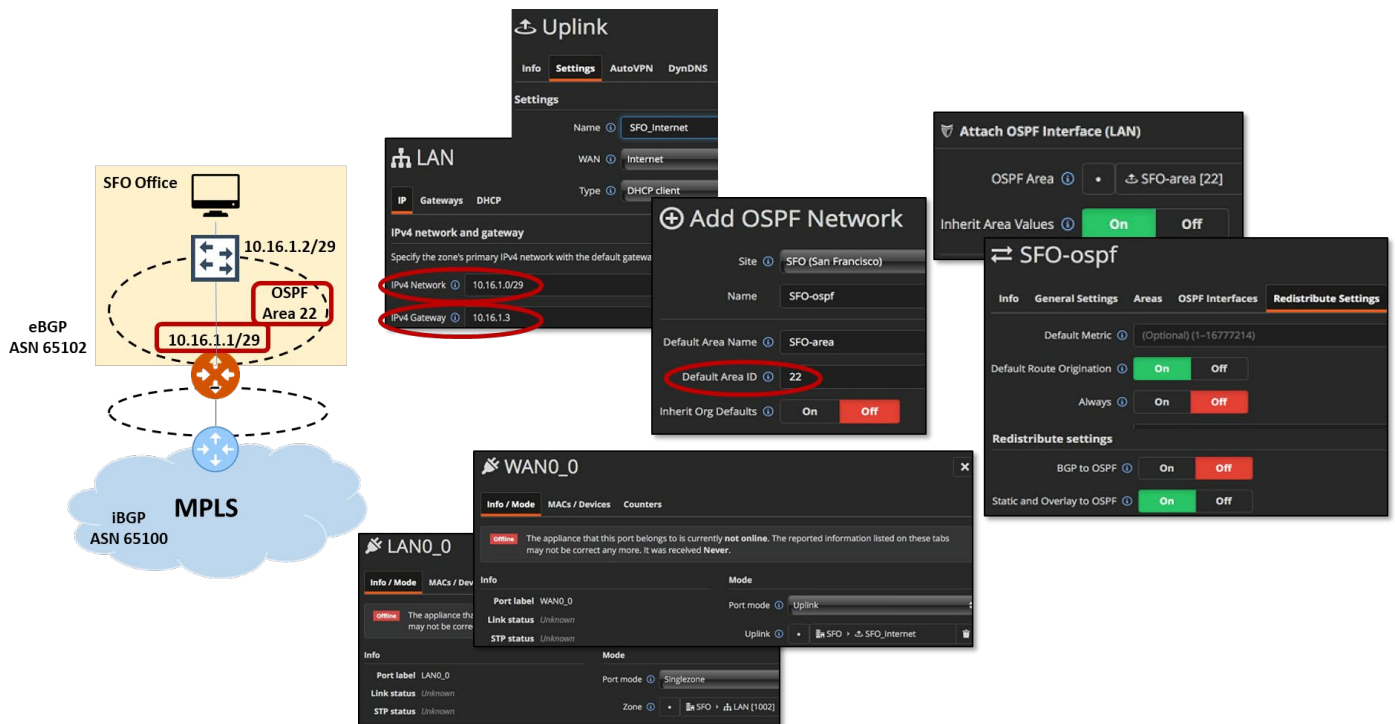
Source: Enterprise Strategy Group

Once we completed the site and shadow appliance's configurations, ESG then deployed the hardware version of the 770-SD. We verified that the 770-SD was connected to the organization's networks so that we could start routing traffic over the SteelHead SD instead of the router.

By replacing a CE router with the Steelhead SD, ESG observed that the management and operations of large, complex IT enterprise networks can be simplified. Because the SteelHead SD combines enterprise routing and SD-WAN capabilities in one appliance, an IT administrator no longer needs to configure and operate separate routing and SD-WAN platforms for network connectivity throughout the organization, potentially saving on capital costs. Moreover, the SCM enables the administrator to manage both routing and SD-WAN functionalities from one management interface, further simplifying IT operations and decreasing associated time and costs.

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ESG Testing – Access to CSP Platforms

ESG then evaluated how the Riverbed SD-WAN solution enables organizations to connect with CSPs for additional compute and storage resources, specifically Amazon Web Services (AWS) and Microsoft Azure. Via the SCM, we first navigated to the *Network Design* menu and clicked on *AWS*, then *Add AWS Account*; the window shown in the left-hand side of Figure 5 displayed step-by-step instructions for linking the SCM to the organization's AWS account. By following the instructions, an IT administrator can import details about the VPCs once and securely interface with them, simplifying how the organization can extend its IT network to the cloud. The process does not have to be performed again.

Once the SCM established secure access to the VPCs, we viewed the VPCs associated with the organization's AWS account by clicking on the tab *Import VPCs* (right-hand side of Figure 5). The SCM showed that we could connect with individual or all subnets associated with VPCs in specific regions.

Figure 5. Importing AWS VPCs via the SCM; Deploying SteelHead Gateway into AWS VPC
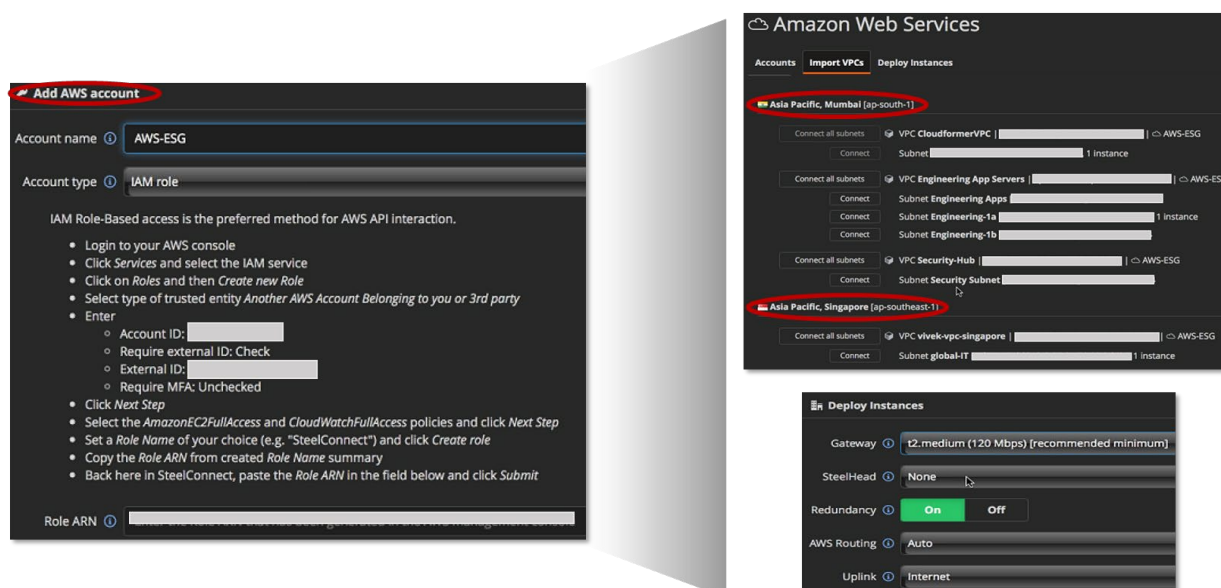
Source: Enterprise Strategy Group

Once ESG connected to select VPCs by clicking on *Connect (all subnets)*, we clicked on *Deploy* next to the desired VPC to deploy a SteelHead gateway. The SCM requested that we choose the AWS instance type for the gateway (shown in Figure 5) and other options such as adding WAN optimization and gateway redundancy. (Importing VNets and deploying SteelHead gateways in Azure follows a similar process as described above.)

As ESG evaluated this use case, we observed how the Riverbed solution simplifies the networking aspect of cloud computing. Connecting an on-premises network to cloud resources typically requires the provisioning and configuration of multiple VPN tunnels. This requires the expertise of a networking professional to ensure that these connections are highly available to transmit application traffic, particularly between an organization's sites and CSPs. That individual would need to work via multiple management interfaces (of the routers and the organization's cloud accounts) to establish these VPN connections. The Riverbed solution reduces the effort required to connect with AWS VPCs and Azure VNets, as an IT administrator can access all cloud resources, deploy gateways, and establish network connections from a centralized point, the SCM interface.

ESG Testing – Path Steering over Hybrid WAN

ESG then observed how an IT administrator can set up a hybrid WAN. An organization may want to offload non-critical traffic from their MPLS WAN onto public Internet links to decrease network latency of business-critical applications. For this use case, we deployed another SteelHead gateway at the site experiencing the network latency. This gateway provided the Internet link on which non-business critical traffic is offloaded, while the CE router at the site remained in place to continue transmitting business-critical traffic. We also observed that an IT administrator can steer traffic onto different network paths. Providing a simpler way of creating a hybrid WAN enables the IT administrator to set up alternative network paths quickly outside of the MPLS WAN.

ESG Testing – Additional Use Cases

ESG reviewed other use cases that demonstrated how the Riverbed SD-WAN solution unifies how network connectivity is established via the SteelHead gateway. For example, an IT administrator could connect ROBOs connected to the MPLS WAN to the rest of the organization by configuring a SteelHead gateway to act as a transit hub in a central network location (e.g., a data center). These ROBOs would then leverage existing MPLS links to transmit traffic via the data center, then connect to other offices via Internet links enabled with SteelHead's SD-WAN capabilities. This scenario enables connectivity between ROBOs without requiring SteelHead gateways to be deployed at all sites.

> ### ⓘ Why This Matters
>
> As IT environments become more complex, providing consistent application access to end-users is increasingly difficult. Administrators face the challenge of serving growing numbers of users and locations, as well as extending their IT environments to the cloud. Organizations can no longer rely solely on traditional methods of networking, specifically router deployment and configuration, to quickly connect end-users with each other and their applications.
>
> ESG validated that the Riverbed SD-WAN solution can simplify how organizations connect their sites to one another and to the cloud via a single SCM interface. Riverbed's simplified deployment process can reduce the amount of time and resources spent on configuring and deploying routers manually, purchasing service provider network resources (i.e., MPLS links), and minimizing the number of management interfaces to be used. The Riverbed SD-WAN solution can eliminate the need for CE routers at every branch office, especially when the organization experiences rapid business growth and wants to extend its network reach globally. The speed with which IT can connect ROBOs, data centers, and CSPs with each other can potentially differentiate how efficiently an organization achieves business objectives.

Use Case – Centralized Policy Management and Orchestration

Enhancing the resiliency and performance of application traffic delivery becomes challenging as the numbers and types of applications used in organizations grows. Organizations must apply traffic and security policies consistently across their IT networks and change them quickly when business needs change. The Riverbed SD-WAN solution empowers organizations to create and deploy these policies centrally to any or all of an organization's sites without configuring routers and other appliances (e.g., firewalls) separately.

ESG Testing – Creating a Traffic Policy Rule

ESG navigated to the *Rules* menu and selected *Outbound/Internal*. We clicked on *New Policy Rule* and the *Create Rule* screen appeared. We configured a rule to block Facebook traffic from traversing the organization's network. We configured the rule based on specific parameters—all or select sites, user groups or traffic sources, and applications. For this rule, we wanted to prevent all users in the Granges site from using Facebook and any of its applications. We confirmed that the rule was in place, as it was listed in the rules configured for the organization.

ESG saw how an IT administrator can decrease time typically required to create and deploy traffic policies across an organization's network by using this single interface. We noted also how the administrator can apply policies to traffic originating from a CSP.
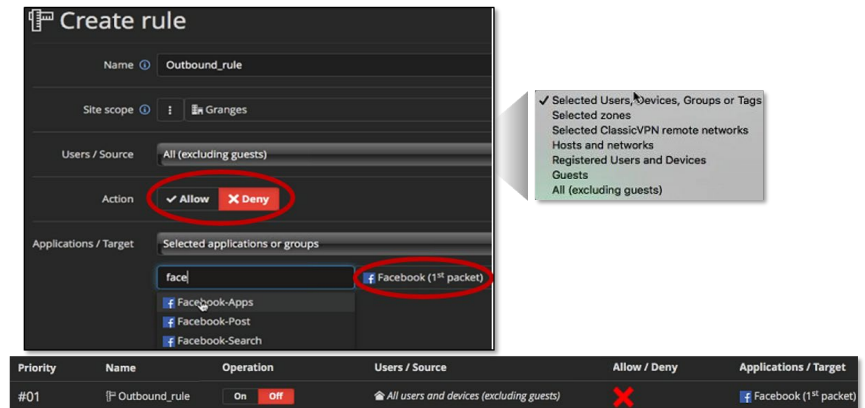
ESG Testing – Policy-based Service Chaining with Third-party Security Services

ESG then navigated again to the *Rules* menu and selected *Traffic Rules*. We viewed the applications grouped by category (Video, Voice, and SaaS), sites and end-users subject to those rules, network paths over which the application traffic can be sent, and priority of traffic sent based on QoS (see Figure 6). We selected the *Video* category and the *Edit Traffic Rule* window appeared.

We modified the rule so that all video traffic would be routed primarily through Zscaler's firewalls to apply all corporate security policies and eliminate the public Internet as a possible traffic path. We clicked on the *Path Preference* menu to reveal network paths available in our test network and chose *Zscaler* as the primary path for all video traffic. We also eliminated the Internet as a possible network path. Once we submitted these changes, we navigated to the *Sites* menu and verified that the Zscaler cloud is the preferred network path for video traffic.

Figure 6. Modifying Traffic Paths for Video-related Applications
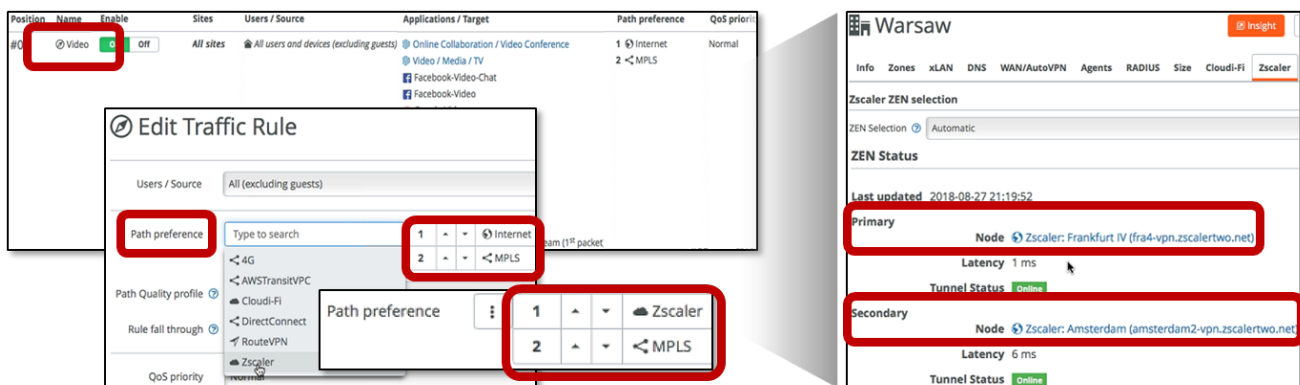
Source: Enterprise Strategy Group

ESG also observed how an IT administrator can direct specific applications over different network paths to ensure network security. For example, the administrator may decide that certain applications are trusted enough (e.g., Office365) such that they do not require additional filtering or analysis. We could create a rule forcing traffic from this application to the underlay (or physical network infrastructure), freeing up other network resources to secure other application traffic.

As we examined this use case, ESG saw how the Riverbed solution simplifies the deployment of traffic rules and policies. An administrator can target traffic policies toward specific subsets of users, sites, or applications without having to configure individual devices—routers and /or firewalls—at multiple sites.

The solution's ability to automate the integration with Zscaler can further help an IT administrator orchestrate how security policies are applied to application traffic. Traditionally, an IT administrator would deploy firewalls at each individual site and integrate them with existing routers. Not only does this consume valuable time and resources, decreasing an organization's business agility, but also ensures security for traffic only on the organization's on-premises network. Application traffic originating from the cloud remains unsecured. The integration of Zscaler with the Riverbed solution will orchestrate the application of security policies regardless of where the traffic originates.

> ### ⓘ Why This Matters
>
> Organizations must account for the resiliency and consistent performance of applications so that end-users can fulfill business needs. As the number and types of applications continue to grow, organizations need to deploy and modify traffic policies to align with business intent. Yet organizations must accomplish this task faster to minimize any disruption in normal business activities. Manually changing these policies at the router level and integrating additional firewalls is simply too slow.
>
> ESG validated that the Riverbed SD-WAN solution simplifies how organizations can deploy traffic policies across an IT environment via a centralized interface. The solution enables IT to apply these policies either across the entire network or on subsets of users, physical locations, or application groups, regardless of whether the application traffic originated from the data center or the cloud. The ease of deploying such policies helps to further increases business agility and continuity).

Use Case – Application Performance Assurance

End-users require both consistent application access and superior application performance to fulfill business needs. Organizations must then utilize a solution that will optimize delivery of application traffic and provide complete visibility into the network, both on-premises and in the cloud. The Riverbed SD-WAN solution leverages its WAN optimization expertise to enable high application performance and provides IT with network visibility to identify and remediate any performance issues quickly.

ESG Testing – Enabling WAN Optimization

ESG first enabled WAN optimization on a SteelHead SD physical appliance. We navigated to the *Sites* option under the *Network Design* menu and selected the "SFO" line item, showing the 770-SD deployed earlier in our testing. By default, WAN optimization is disabled. When the SCM displayed the *Settings* window for this appliance, we clicked on the *Services* tab and clicked *Enabled* next to *WAN Optimization Service*. The 770-SD could then then apply WAN optimization to any application traffic traversing the appliance. The same steps could be followed for any deployed appliance via the SCM. To enable WAN optimization of traffic originating from AWS VPCs or Azure VNets, the IT administrator needs to deploy a separate SteelHead instance for WAN optimization.
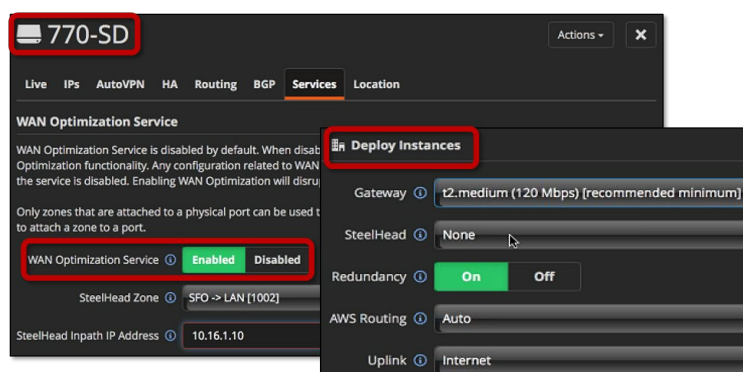
ESG Testing – Network Visibility

We then examined the network visibility provided by the SCM. We navigated to *Insights* on the SCM menu and found that we could access views from an organization, site, user, and application perspective. We first navigated to the *Organizational Summary* that noted both network-related metric summaries (such as uplink throughput and latency), and summaries of sites, applications, and users logging the most application activity. As Figure 7 shows, we noted that the Internet uplink was experiencing high latency.

Figure 7. SCM Visibility into Organization's Sites, Users, and Applications
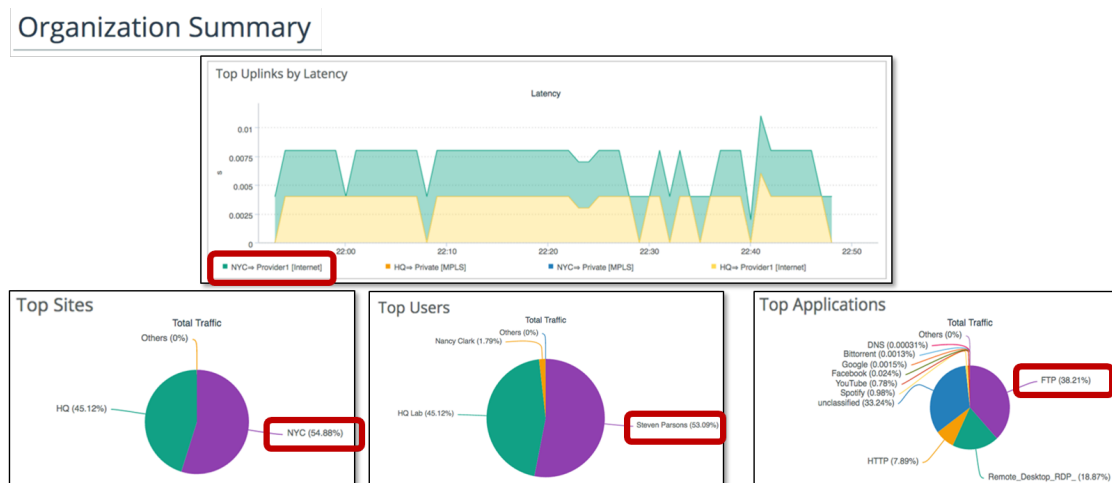
Source: Enterprise Strategy Group

An IT administrator can use the *Insights* summaries to view application activity and determine if there may be potential performance-impacting issues to resolve. The exhibited drilldown shows that the *Insights* feature can help an IT administrator detect issues in application performance from multiple perspectives in a few screens. This can decrease the time for IT to identify and resolve issues that may negatively affect application performance for all users within an organization. Reducing the time to identify performance-impacting issues can ultimately help the organization to resolve them quickly, allowing end-users to continue using applications. It was clear to see that Riverbed has leveraged its expertise in application and network performance management to provide these comprehensive views revealing application activity.

> ## ℹ️ Why This Matters
>
> Because the numbers of users and applications have increased significantly in the past two years, organizations are challenged to ensure robust application performance at all times. Optimizing transport of network traffic and having complete visibility of network activity at the application level can support organizations in providing application performance assurance to all end-users. ESG research found that enterprises' definition of an SD-WAN solution would account for other capabilities to address network complexity holistically, including WAN optimization.[3]
>
> ESG validated that the Riverbed SD-WAN solution integrates its WAN optimization capabilities seamlessly, allowing IT to optimize application traffic transport at any given site within the organization. Summaries of IT network activity from multiple perspectives—organization, site, user, and application—allow the IT administrator to quickly detect and resolve potential application performance-impacting issues. Organizations that are investing in solutions in the digital world need to ensure that customers and end-users have a better experience—enhanced application performance drives a better customer experience.

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[3] Source: ESG Master Survey Results, *Trends in Network Modernization*, November 2017.

The Bigger Truth

Increasing network complexity makes it difficult for today's organizations to maintain business agility and deliver positive digital experiences. To better deal with the proliferation of end-users, new applications, and multiple cloud services, companies are increasingly deploying SD-WAN solutions. As organizations evaluate their options, organizations need to decide if they want to take a point product approach or a platform / architectural approach.

Organizations today must connect growing numbers of users and locations with each other and the cloud, both simply and securely. They need to deploy and modify traffic and security policies to align with business intent so that end-users can effectively fulfill business needs. To further ensure application performance, organizations must have the means to optimize transport of network traffic and complete visibility of network activity at the application level. However, organizations will struggle to rely solely on traditional methods of networking, specifically router deployment and configuration, to accomplish these objectives holistically.

ESG validated that the Riverbed SD-WAN solution simplifies how network connectivity is established across an organization's IT environment, centralizes policy management and orchestration, and assures application performance across the IT network. We observed how the Riverbed SD-WAN solution saves time and resources in setting up virtual connections between disparate ROBOs and between the organization and its CSPs via a single management interface, thus decreasing operational expenses. Organizations can potentially decrease capital expenses related to CE routers as SteelHead gateways combine both routing and SD-WAN capabilities. We also verified that the solution enables organizations to create and modify traffic policies to all or subsets of users, sites, and applications via a single interface. Finally, we noted the ability for IT to enhance and examine network and application performance comprehensively via the SCM, as it leverages Riverbed's expertise in WAN optimization.

ESG views the Riverbed SD-WAN solution as a viable alternative for organizations facing the challenge of managing large, complex enterprise IT networks that are constantly changing to accommodate new business demands. For enterprises embarking on digital transformation efforts that need to have comprehensive network solutions, we suggest taking a further look at Riverbed's SD-WAN solution.