

SteelHead Hybrid Networking

Turn your network into an enabler of your hybrid enterprise, increase reliability, reduce costs, and achieve optimal user experience with Riverbed SteelHead hybrid networking.

Overview

Global enterprises are rapidly adopting cloud infrastructure such as Amazon Web Services (AWS) or Microsoft Azure and Software as a Service (SaaS) applications such as Microsoft Office 365, Salesforce.com, ServiceNow or Box. The Internet and the cloud are now part of business-critical infrastructures. Enterprises are becoming a hybrid mix of on-premises and off-premises assets.

To efficiently support the combined public and private resources, the network itself needs to go hybrid, adding the strengths of highly reliable Multiprotocol Label Switching (MPLS) and the ubiquity, price, and speed of the Internet. Riverbed's SteelHead™ hybrid networking solutions enable an excellent user experience for both your on-premises and cloud-based applications and makes your network faster, cheaper, easier to manage, and also more reliable.

The rise of the hybrid enterprise

Today businesses are rapidly adopting cloud infrastructure and SaaS applications broadly across the enterprise. Enterprise workforces are using applications, managing data, and conducting research along with other activities in the cloud. In fact, over 40% of businesses with 1,000 plus customers surveyed by Forrester in 2014 have already replaced, or plan to replace within two years, most/all applications with SaaS in categories including marketing automation, sales force automation, commerce software, customer service and support, and industry-specific software.¹

Yet data, including large corporate files, unified communications, and recreational traffic that are destined for the public Internet, still travel through the costly MPLS network. That is an inefficient way to access services and applications such as cloud collaboration or cloud Customer Relationship Management (CRM) that can be accessed directly on the Internet without ever touching the corporate MPLS network. The MPLS cost is high, especially when

¹ Application Adoption Trends 2015: The SaaS Boom Continues as Businesses Demand Agility, Forrester's Business Technographics Global Software Survey, 2014

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compared to broadband Internet. Typical studies tell us that an MPLS megabyte can cost up to 200x more than a broadband megabyte per month.²

Until recently, enterprises followed a model where the vast majority of applications were hosted within private data centers and accessed through a Wide Area Network (WAN) relying on MPLS network services. But in an IT environment with public and private resources, a hybrid network that combines the strengths of highly reliable MPLS links with the ubiquity and lower cost of an Internet infrastructure can deliver both higher performance and more economy.

A network optimized for the hybrid enterprise

Hybrid networks represent the new optimal network architecture, offering cost-effectiveness and performance for organizations seeing growth in Internet traffic or those combining on-premises with off-premises IT assets through SaaS or infrastructure as a service (IaaS).

Hybrid networks offer two complementary capabilities.

Internet backhaul to off-load traffic from MPLS - tripling the bandwidth available to users

For enterprises struggling with demand for bandwidth, moving from pure MPLS to a hybrid network that truly combines MPLS and Internet-based secured overlay links to backhaul traffic to the data center or across branches (such as with Unified Communication and Collaboration traffic) is a cost-effective option. Riverbed customers report an average of a dramatic 300% growth

in the available bandwidth for branches without increasing the overall networking budget.

Business Imperatives

This shift to a hybrid network satisfies the core imperatives for any enterprise network:

- **Lower costs**

Growing a network with commercial-grade Internet to complement premium-priced MPLS bandwidth lets you scale the network to match growth and usage patterns, with a flat or even a reduced impact on IT spend.

- **Increase performance**

When a hybrid network is managed with path selection, the bandwidth available to applications is dramatically improved. Internet links can be fully utilized, freeing precious MPLS bandwidth. Bottlenecks and latency are minimized. Additionally, when implemented, local Internet breakouts allow a direct connection to cloud-based applications without a “boomerang” to the corporate data center. Both solutions translate into optimal performance and high levels of user satisfaction.

Local Internet breakouts to off-load Internet traffic and optimize performance for SaaS traffic

Hybrid networks can be used to easily direct a selected part or all of the Internet-bound traffic to local Internet gateways. Let’s consider a user in San Francisco who is forced to go through MPLS to a default central Internet

² <http://www.networkworld.com/community/blog/why-does-mpls-cost-so-much-more-internet-connectivity>

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breakout in New York to access a SaaS application that is actually hosted in a data center based in Seattle. This situation creates a "boomerang effect" marked by added latency and unnecessary usage of expensive MPLS bandwidth. If a local Internet connection is present in the San Francisco branch, hybrid networks can selectively direct the forwarding of the user's SaaS traffic to the Seattle-based data center, while other Internet traffic could continue to flow through the secured gateway in New York. The result is faster performance and a smarter utilization of network resources.

Riverbed makes hybrid networks easy and high performing

Until now, creating a hybrid networking architecture able to fully support a mix of on-premises and cloud-based workloads, at the right cost, has been obstructed by two key issues:

- The complexity of defining which traffic goes on which network or the complexity of setting up appropriate secured tunnels. Hard-coded router configurations and legacy technologies like policy-based routing are an intrusive burden on network administration and, ultimately, are neither reliable nor granular enough to provide value. Without a simple way to define rules and configure the hybrid network, implementation of hybrid networking has remained difficult.
- Lack of a proper level of integration with WAN optimization capabilities to reduce application latency. Unfortunately, a hybrid network does not make latency go away or mitigate the importance of properly optimizing traffic.

With Riverbed, organizations can embrace hybrid networks to maximize the performance of business-critical applications, boost network availability, and reduce costs while retaining IT control and minimizing complexity. In addition, they can benefit from optimized use of network resources as well as accelerated end user experience for all of their applications – on-premises and those hosted in the Cloud.

SteelHead includes all of the major building blocks to build high-performance yet simple to manage hybrid networks, including:

- Network and application-aware path selection to direct traffic on the appropriate network (MPLS, Internet, etc.)
- Dynamic tunneling with a central control plane that enables secure backhauling of branch traffic to the corporate data center and other branches across the Internet
- Simple interface to zScaler or other cloud-based security service providers that enables local Internet breakouts without requiring further investment in on-premises Internet security appliances
- Inbound QoS to manage local Internet breakouts and protect business Internet traffic against surges in recreational Internet traffic
- Best-in-class WAN optimization capabilities for on-premises applications – optimization that is able to mitigate latency for critical business processes, protect real-time and interactive applications, and optimize network resource usage

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- Unique WAN optimization capabilities for cloud applications delivered across the Internet: including SaaS apps such as Office 365, Salesforce.com, Box.net, and Success Factors and IaaS/PaaS such as Amazon Web Services or Microsoft Azure
- Crucial insights into network performance and usage at each branch for all on-premises and cloud traffic with SteelCentral NetProfiler and SteelHead integration
- Continuous and easy troubleshooting capabilities at the branch with the integration of SteelCentral NetShark and SteelHead, which captures the packets for real-time and retrospective analysis
- Breakthrough capability to monitor end-user experience for not only on-premises but also SaaS applications end-to-end with integration between SteelHead and SteelCentral AppResponse
- Management plane provided by SteelCentral™ Controller for SteelHead to drive global hybrid networks using simple abstractions

Riverbed delivers the most comprehensive solution by far to enable a smooth transition to a hybrid enterprise.

Network- and application-aware path selection capabilities

Path selection is required to efficiently use the multiple available paths in the branch and data center. A typical branch configuration has three paths:

- MPLS
- Internet link combined with a secured overlay connecting the branch back to the data center using Internet protocol security (IPsec)
- Direct to the Internet

Unlike legacy policy-based routing technologies, SteelHead path selection technology offers compelling capabilities:

- Application-aware with the capability to identify over 1300 applications and precisely distinguish business-critical applications from less important applications
- Constantly senses path availability in real time using active probes for dynamic path failover
- Simple to manage with SteelCentral Controller for SteelHead and its global management plane
- Integrated application visibility and WAN optimization for complete management of business-critical applications over the WAN

Application-aware

Legacy solutions classify traffic using port numbers and IP addresses. Business applications based on hypertext transfer protocol (HTTP) are by default classified in the same bucket as non-critical traffic, such as YouTube traffic. This default can only be resolved using classification based on IP addresses, leading to configuration complexity and increased operational risks. With SteelHead path selection technology, flows are classified using deep packet inspection (DPI)-based application awareness, allowing you to precisely steer traffic on different paths according to the true nature and criticality of traffic. For example, SteelHead path selection technology even offers the capability to clearly distinguish between secure sockets layer (SSL)-encrypted applications. Instead of looking at Facebook as a consumer app, SteelHead path selection can allow Facebook news feeds and updates but block non-business applications such as Candy Crush.

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Actively sensing path availability

In legacy solutions, path availability is determined using routing-based metrics that are slow to converge and unable to report brownout situations (when the network link is still up but quality of the path is below the usability threshold). As a result, organizations are not compelled to off-load more than low importance applications over less reliable paths like the Internet. With SteelHead path selection, path availability is constantly monitored; active probes rapidly detect both blackout and brownout situations where the path quality is degraded to the point that sensitive applications can no longer be delivered with a good quality of experience. Path selection rapidly and dynamically adapts the paths before end users are impacted, thus allowing even business-critical applications to utilize paths like Internet based-ones if needed.

Transparency and simplicity

Unlike other approaches, SteelHead path selection technology uses a transparent overlay service versus changing the packet-forwarding plane. This approach results in a clean abstraction between network layers and obviates the need to reconfigure routers with complex rules. Thus, the technology is transparent to the existing network and is also easy to configure.

A dynamic tunneling capability with a central control plane that enables secure backhauling

SteelHead hybrid-networking technology includes a dynamic tunneling capability that enables secure backhauling of branch traffic to the corporate data center across the Internet using IPsec.

Traditional management of secured overlay tunnels for the purpose of backhauling traffic relies on router or firewall configurations that typically:

- Require hardware upgrades to cope with the computational load of encryption
- Are complex to configure and difficult to manage
- Do not support building overlay tunnels beyond hub and spoke topologies and therefore do not support branch-to-branch overlays as required by unified communication and collaboration (UCC) peer-to-peer traffic

CASE IN POINT

Hybrid Networks Increase Performance and Reduce Costs

A global consumer goods company was approaching a major MPLS WAN refresh cycle and contract renewal. But growing the existing infrastructure to meet projected bandwidth needs would be very costly. The company wanted to control MPLS circuit upgrades and expand network capacity significantly at the same time.

The company deployed SteelHead solutions to fully leverage a hybrid network combining MPLS, Internet backhauling, and local Internet breakouts. SteelHead path selection ensures the right traffic travels the right path: High-bandwidth internal applications (such as internal videos, email, anti-virus updates, Microsoft System Center Configuration Manager (SCCM) and SharePoint, and backup and replication) is sent to Internet VPN links; Internet and SaaS traffic is sent to the public Internet in regional hubs.

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Unlike a traditional IPsec configuration that requires explicit tunnel buildup, SteelHead secure transport technology is based on the notion of secured groups. SteelHead allows for the regrouping of appliances connected to a network that requires encryption (typically an Internet-based network) into one or more secure transport groups.

Once the group has been defined, SteelHead appliances automatically and dynamically create the appropriate overlay tunnels between each other in a full mesh fashion. The overlay tunnels dynamically form a new secured network that can be seamlessly used by SteelHead path selection technology to securely route traffic between any sites, including from the branch to the data center and from branch to branch.

With SteelHead secure transport technology, enterprises can benefit from secured communication over networks like the Internet to backhaul their traffic. SteelHead secure transport technology:

- Permits secured overlay without requiring any upgrade of routers or firewalls
- Supports branch-to-branch communications, including UCC peer-to-peer traffic
- Is simple to manage with SteelCentral Controller for SteelHead and its global management plane
- Has a minimal cost of configuration and cost of change management thanks to automated tunnel configuration

A simple interface to zScaler or other cloud security service providers

As they embrace local Internet breakouts, enterprises must strengthen their security environments within the branch. To do so, enterprises typically implement Secure Web Gateways (SWGs) that analyze specific ports like HTTP/ hypertext transfer protocol secure (HTTPS) ports and often use SWGs in combination with advanced threat detection (ATD) to detect the more advanced attacks.

These capabilities are now being made available as a cloud service. Companies like zScaler have deployed hundreds of points of presence across the globe where SWG and ATD capabilities are hosted, managed, and sold as a cloud service. Such a distributed infrastructure effectively allows flexible implementation of the required branch security for Internet-bound traffic without a significant impact on performance. However, as enterprises embrace cloud-based security services, they must seamlessly integrate them into their hybrid networking architecture.

SteelHead hybrid networking includes a simple “cloud-tethering” interface to zScaler or other cloud-based security service providers in the form of easy-to-configure generic routing encapsulation (GRE) tunneling. In combination with other SteelHead hybrid-networking technology, this cloud-tethering capability allows enterprises to enable local Internet breakouts without requiring further investment in on-premises Internet security appliances.

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CASE IN POINT

Zero Dollars and 3x the Bandwidth

A large engineering firm with 180 offices in 31 countries needed to support the traffic from their traditional enterprise applications and ever-increasing Web traffic. Buying more WAN bandwidth was an unsustainable approach. Their goal was to increase aggregate bandwidth across the WAN (from 3 Gbps to 9 Gbps) with a flat budget impact.

They deployed SteelHead to continue to backhaul all Internet-destined traffic to their headquarters for a simplified Internet security design, while augmenting their bandwidth with commodity Internet links and IPsec-based security for greater aggregate bandwidth.

Inbound QoS to manage local Internet breakouts

SteelHead includes advanced quality of service (QoS) capabilities to protect business-critical applications against less important ones. This capability is typically used in an outbound fashion as traffic leaves its source.

When enterprises use local Internet breakouts in the branch, the incoming (inbound) traffic from the Internet originates from multiple disparate sources that are not equipped with a SteelHead solution. As a result, the finite bandwidth of the local Internet pipe can be filled as branch users consume a variety of business-critical SaaS applications combined with less critical and sometimes bandwidth-heavy applications like YouTube. To expand protection of business-critical applications to Internet-bound applications, SteelHead includes a unique inbound QoS capability that manages traffic from the destination

instead of from the source as with traditional QoS.

This technology, which cannot be found in typical routers, uses dynamic configuration of SteelHead QoS queues to achieve a feedback loop with any remote sources using transmission control protocol (TCP).

When required to prevent congestion, SteelHead inbound QoS effectively slows down less critical inbound traffic to make room for more business-critical flows, thus protecting experience and productivity for users of those applications. (Figure1)

In addition, SteelCentral NetProfiler when integrated with SteelHead provides visibility into SteelHead QoS to understand whether quality of service settings are meeting expectations by application or where and when changes should be made to ensure end user performance.

Best-in-class WAN optimization capabilities for on-premises applications

A hybrid network does not make latency go away nor does it mitigate the importance of properly optimizing traffic. SteelHead is the market-leading solution for application-aware optimization of on-premises workloads, supporting the latest versions of Microsoft applications, clients, and leading business critical applications, including those based on file transfers but also real-time applications such as Microsoft Lync and video streaming, or interactive applications based on Citrix. SteelHead award-winning deduplication technology further increases the throughput available to users in the branch by removing any redundancies. Finally, SteelHead QoS enables a total control on how the bandwidth of the hybrid network is used among critical and non-critical applications.

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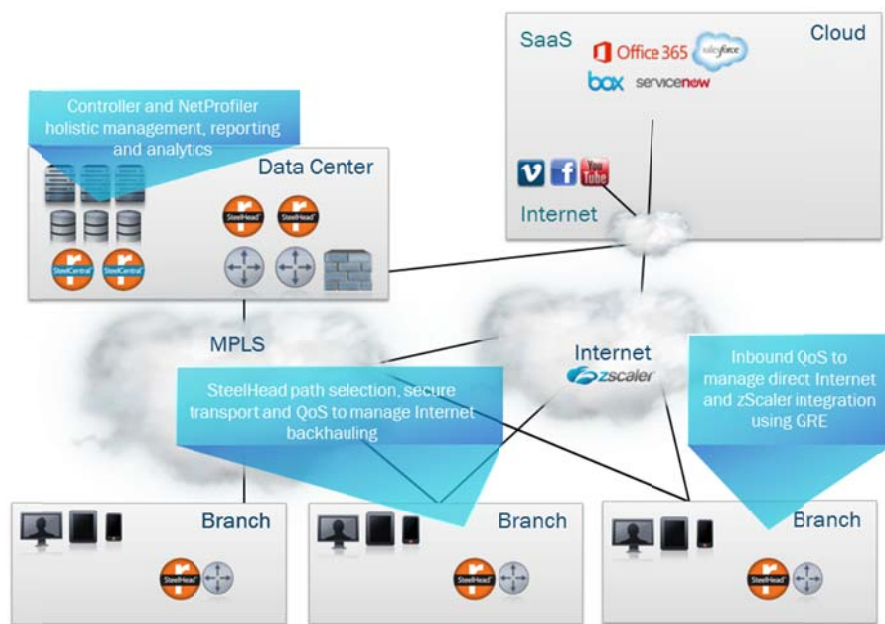


Figure 1
SteelHead comprehensive hybrid-networking capabilities

Unique WAN optimization capabilities for cloud applications delivered across the Internet

As enterprises are adopting local Internet breakouts, the notion of optimizing the performance of applications delivered across the Internet is becoming increasingly important. SteelHead includes 3 classes of solutions for improving end-user experience for Internet-bound applications.

SteelHead SaaS for end-to-end optimization of Microsoft Office 365, Salesforce.com, Box.net and more

Microsoft Office 365 and Dynamics CRM, Box.net, Salesforce.com, and ServiceNow are among the most

used SaaS applications accessed daily by users worldwide. Organizations using these SaaS services must select an instance, and therefore a location, where their data will be hosted. By doing so, just like when they pick a location for any on-premises workload, organizations are consciously choosing those users who will be far away from the data and those who will be close. Yet the same level of service is required to make those users productive, independent of the location of the SaaS instance.

Riverbed SteelHead SaaS accelerates Microsoft® Office 365, Salesforce.com, Box.Net and more from the cloud in the same way that traditional SteelHead products accelerate enterprise applications running on corporate

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networks. SteelHead SaaS mitigates the impact of latency and aligns performance to the maximum for all users whether they are close or far from the SaaS application.

SteelHead SaaS dynamically instantiates virtual SteelHead appliances as close as possible from the SaaS instance, leveraging the formidable Akamai footprint, thus enabling an end-to-end management of the application without any intrusion in the SaaS provider

datacenters. SteelHead SaaS also leverages Akamai's SureRoute Internet overlay for optimized latency and bandwidth for the Internet portion of the SaaS application delivery chain.

Delivered as a service, SteelHead SaaS is easy to deploy and requires no changes to the user side or in the SaaS provider cloud. IT can increase the service availability based on user demand, while meeting and exceeding IT service agreements. (Figure 2)

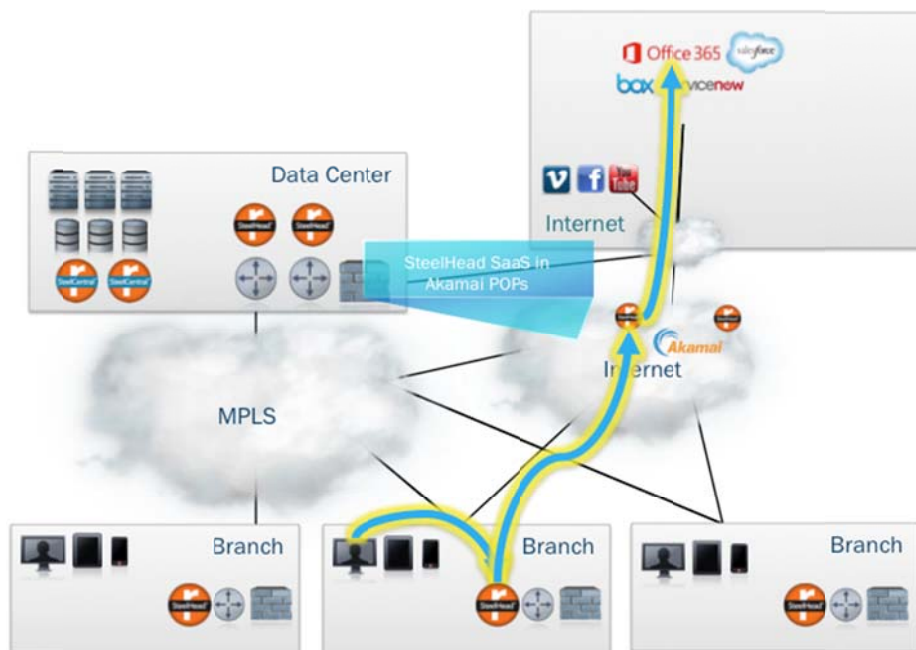


Figure 2
Unique SaaS acceleration leveraging SteelHead technology over the Akamai footprint

SteelHead CX for IaaS to optimize Microsoft Azure and Amazon workloads and more end-to-end

SteelHead CX for IaaS extends the optimization solution for the hybrid enterprise to IaaS cloud environments

such as Microsoft Azure, Amazon Web Services (AWS), VMware ESX-hosted clouds and vCloud Air. By overcoming application and network performance problems with data, application, and transport streamlining, SteelHead CX speeds migration to the

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public cloud and accelerates access for users from virtually any location.

SteelHead CX is available in the marketplace of both Amazon and Azure services.

SteelHead Web-Proxy to cache any Internet-based applications over HTTP/S, including YouTube videos

SteelHead also includes a solution for applications that cannot be accelerated using SteelHead end to end - a single-ended Web proxy that transparently intercepts all traffic bound to the Internet. The Web proxy improves performance by providing Web object caching on both HTTP and HTTPS traffic. The efficient caching algorithm dramatically reduces the use of Internet traffic when multiple users are accessing the same content. The proxy includes a unique feature to cache videos including YouTube videos, thus enabling the use of HD content for business use, like training videos, without the need to overprovision the Internet links.

Crucial insights into network performance and usage at each branch for all on-premises and cloud traffic

With hybrid networks, obtaining holistic visibility on the traffic and the network becomes a distributed problem. It requires more instrumentation devices than ever.

SteelHead devices are ideally placed at each branch or cloud location to solve this problem.

SteelHead can be seamlessly integrated with SteelCentral NetProfiler to deliver visibility beyond traditional NetFlow reporting for on-premises and cloud-bound traffic. SteelHead acts as a remote probe that captures information about all sessions flowing to and

from the branch (and also to and from cloud locations when SteelHead CX for IaaS is in use).

Combined visibility and control workflows are extremely easy to handle as SteelHead and SteelCentral NetProfiler share the same application definitions: application labels used in the SteelHead UI are the same as in SteelCentral NetProfiler reports.

In addition, SteelHead products are computing individual round trip time (RTT) on each section of an optimized TCP session, enabling users to rebuild a consistent view of end-to-end RTT inside SteelCentral NetProfiler reports.

SteelHead CX has embedded NetShark capabilities. As a result, it offers on-demand, rather than continuous, packet capture. SteelHead EX also integrates with SteelCentral NetShark™ for SteelHead EX to provide onboard packet capture and storage. This feature offers continuous packet capture anywhere SteelHead appliances have been deployed within an enterprise network.

A breakthrough capability to monitor end-user experience for SaaS applications

As organizations are leveraging cloud based applications, monitoring and troubleshooting end-user experience has never been so challenging and important. Even if, for cloud based applications, the WAN is not a major component of the application delivery chain, network teams will be faced by the need to respond to performance issues over the public Internet.

SteelHead leverages SteelCentral AppResponse to provide end-user experience information where applications are delivered, at the branch. SteelHead

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appliances deployed in remote locations instrument HTTP/S flows to build an accurate view of the page load time of all web applications that are optimized by SteelHead. Operators can clearly see a breakdown of the end-user experience as it relates to the server, the network and the SteelHead appliances.

This capability works in conjunction with SteelHead appliances placed close to the source of traffic, in the on-premises datacenter, in cloud-based datacenters with SteelHead CX for IaaS, and when using SteelHead SaaS acceleration. As a result, and for the first time, it's possible to get end-user experience information for all optimized web applications including SaaS applications like Salesforce.com. With SteelHead appliances deployed as close as possible to the distributed instances of the cloud provider across the Akamai network, reports can show the root cause of performance degradation – whether the network or the cloud provider instance. SteelCentral AppResponse and SteelHead integration provide a unique combination to monitor service levels as delivered by the cloud provider. (Figure 3)

A new management plane to drive global hybrid networks using simple abstractions

SteelCentral Controller for SteelHead's central management console dramatically improves the management and usability of control capabilities. While SteelHead optimization has always been praised for its ease of use, control capabilities that the industry has delivered for years – all QoS, path selection or VPN solutions delivered by the industry - have been a nightmare to manage. With the new controller, Riverbed exposes users to an intuitive interface and management plane based on high-level abstractions such as applications, sites, uplinks, or networks that match the way they see their IT environment. SteelCentral Controller for SteelHead relies on a control plane designed to support intent-based configuration that provides a translation of global parameters into local SteelHead policies. With SteelCentral Controller for SteelHead, customers can implement new, more efficient configuration and change management workflows that make hybrid-networking capabilities truly usable at scale.

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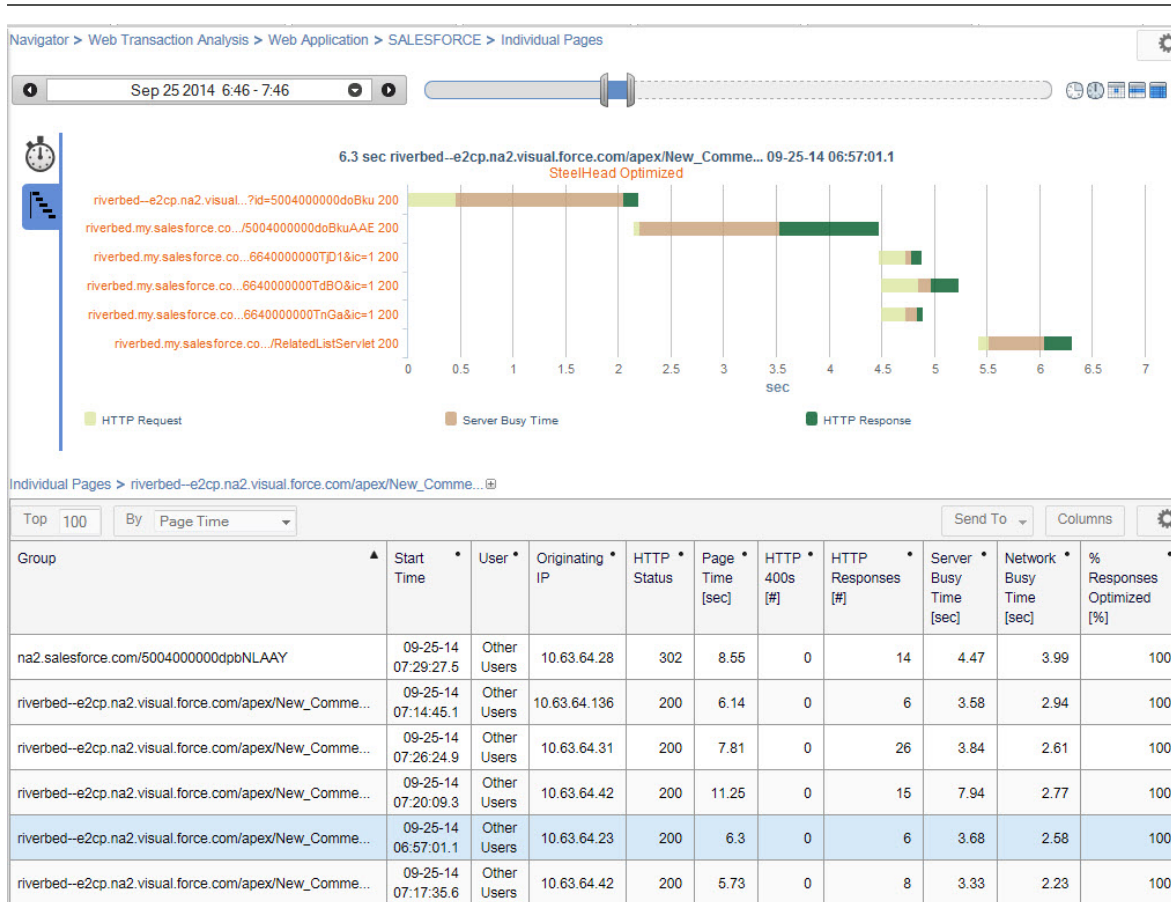


Figure 3
End-user experience visibility on SteelHead Optimized SaaS traffic from SteelCentral AppResponse

Riverbed: more than hybrid networking

With Riverbed, organizations can embrace hybrid networks to maximize the performance of business-critical applications, boost network availability, and reduce costs while retaining IT control and minimizing complexity. Hybrid networks can leverage Riverbed best-in-class WAN optimization for both on-premises

and cloud based applications. Riverbed's SteelHead hybrid networking enables an excellent user experience for both your on-premises and cloud-based applications and makes your network faster, cheaper, easier to manage, and more reliable at the same time.

To learn all the details, contact us today at www.riverbed.com/hybridnetwork.

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Riverbed, at more than \$1 billion in annual revenue, is the leader in application performance infrastructure, delivering the most complete platform for the hybrid enterprise to ensure applications perform as expected, data is always available when needed, and performance issues can be proactively detected and resolved before impacting business performance. Riverbed enables hybrid enterprises to transform application performance into a competitive advantage by maximizing employee productivity and leveraging IT to create new forms of operational agility. Riverbed's 26,000+ customers include 97% of the *Fortune* 100 and 98% of the *Forbes* Global 100. Learn more at www.riverbed.com/steelhead.



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