

# Say Goodbye to Latency and Congestion in SSL/TLS Traffic





The modern enterprise relies on many business applications to operate – ranging from back-end applications facilitating financial procedures to front-end software enhancing employee operations and fostering customer engagement. For an enterprise to be productive, employees must be able to access business applications on-demand with a high-quality experience, regardless of location.

According to [Bloomberg](#), employees switch between business applications an average of 1,200 times per day, so poorly performing applications can quickly lead to employee frustration and negatively impact productivity, ultimately hurting the company's bottom line.

Organizations can host applications in various locations – on-premises, in the cloud, or even via Software-as-a-Service (SaaS). In addition to different locations for hosting applications, companies using them often have multiple international branches and hybrid workforces.

Because communication between users and applications happens over wide area networks (WANs), typically via the Internet, traffic is secured with Transport Layer Security (TLS) or its predecessor, Secure Socket Layer (SSL) protocols. SSL and TLS are cryptographic protocols that provide security for network communications by encrypting the segments of network connections at the Transport Layer end-to-end.

Today, over [263 million SSL certificates](#) protect web browsing and remote desktop browsing sessions, file transfers, and virtual private networks (VPNs). Every application connected through a browser, and most SaaS applications use SSL or TLS encryption. In fact, [95% of web traffic](#) today is secured with SSL/TLS.

Network latency – or delays due to the distance between the client and server or user and the data they're trying to access – poses the biggest challenge to business productivity, especially if applications rely on chatty protocols or frequently exchange large amounts of data.

Here's where wide area network (WAN) optimization and acceleration comes into play – optimizing SSL/TLS WAN traffic reduces costs and improves application performance and productivity.



# Why is SSL/TLS WAN acceleration necessary?

Whether or not traffic uses SSL/TLS protocols for security, [WAN acceleration](#) technologies are the same – they improve the efficiency of data transfers between centralized data centers and remote locations across the WAN. The goal of acceleration is to improve the end user experience by increasing the speed with which they can access business-critical applications and information.

Common WAN performance killers include:

## Network congestion

When the amount of data sent through the network exceeds the network's processing capacity, then congestion can occur. Congestion can slow down data transfer and cause packet loss.

Network congestion ultimately affects the performance of critical applications and creates a poor digital experience for employees. For many organizations, this translates to lower productivity rates and, ultimately, a decrease in revenue. When application performance lags, employees struggle to complete their tasks. Many organizations react by increasing bandwidth, which is costly, without dealing with the underlying issues fueling the congestion.

## High network latency

Network latency refers to the time a data packet needs to travel from one place to another. Similar to the physical transfer of information, the theoretical best scenario for network latency can only happen at the speed of light. In the real world, transfer speed is much lower due to factors such as cabling, network equipment traversal, and signal loss. For reference, latency between Chicago and New York can be close to 21ms, and between San Francisco and New York can be close to 70ms.

The negative effects of latency increase significantly if the application is particularly chatty. As you keep adding up latency for each required round-trip, delays become noticeable by the user and translate into users struggling to open or edit files: a frustrating, poor digital user experience.

Why does this matter so much? Recently, Forrester found that [60% of technology](#) and business decision-makers planned to prioritize improving digital employee experiences to attract talent, improve productivity, and promote employee engagement. In our own [2023 Riverbed Global Digital Employee Experience \(DEX\) Survey](#), we found that 91% of respondents reported plans to provide more advanced digital experiences in the next five years to meet the demands of younger employees entering the workforce.

The surge in remote work has created significantly more problems relating to network latency, congestion, and application performance. The impact of a negative digital experience from high latency can extend beyond productivity and revenue loss and affect a company's ability to find and retain talent, especially as younger generations enter the workforce. This can, in turn, hurt a company's brand reputation.



# The challenge of SSL/TLS acceleration

While the necessity of WAN acceleration is clear, many organizations still struggle to optimize their business applications, often due to the vast adoption of SSL/TLS.

When optimizing SSL/TLS WAN traffic, the traffic must be decrypted before optimization and then re-encrypted prior to sending, ensuring that it remains secure. Organizations need to collect and manage certificates and private keys to accomplish this.

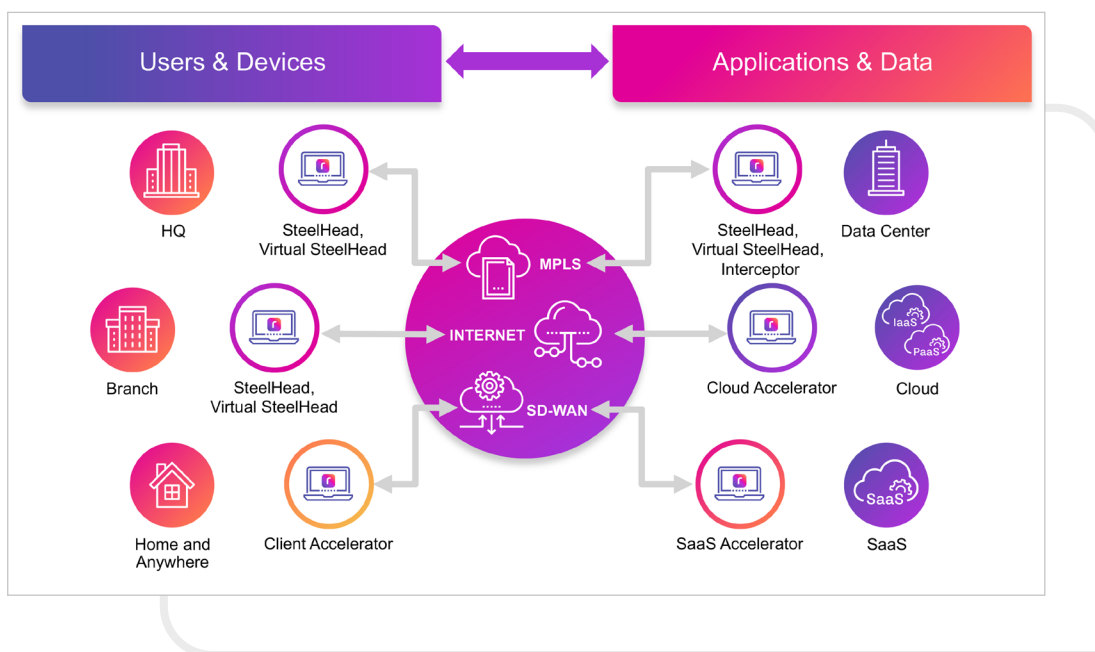
The logistics around certificate lifecycle management can be a big challenge, especially in organizations with limited resources and expertise. There may be hundreds of applications, each with specific certificates, private keys to manage, and certificate expiration dates.

As a result of the challenges around certificate management, companies face continued congestion, latency, and poor application performance, sometimes rendering mission-critical applications unusable.

## SSL/TLS traffic optimization with Riverbed Acceleration solutions

Organizations looking to improve the quality of their SSL/TLS traffic can leverage Riverbed Acceleration solutions. Riverbed Acceleration solutions empower companies to boost application and service performance across their distributed enterprise – ensuring fast, agile, and secure acceleration of any app, over any network to users, anywhere.

Because traffic is accelerated and optimized to and from places and people, there must be an acceleration component at both the headend (applications and data) and endpoint (users and devices) to communicate over various networks.



**Figure 1:** Riverbed Acceleration ecosystem - bringing users, apps, and data together.



## SteelHead

A key component of the Riverbed Acceleration solutions, **SteelHead** – a physical or virtual appliance that optimizes and accelerates network traffic and the performance of applications – leverages application awareness to distinguish between network traffic. The product can be deployed on both data center and branch offices and offers transport, data, and application streamlining – providing up to **99% reduction** in bandwidth consumption and 10x acceleration of SSL/TLS encrypted traffic.



## Client Accelerator

**Client Accelerator** extends SteelHead’s WAN optimization capabilities to remote employees and road warriors. The product operates directly on the end user’s laptop and peers with other SteelHead products to provide access to business-critical applications with speed and security, regardless of location.



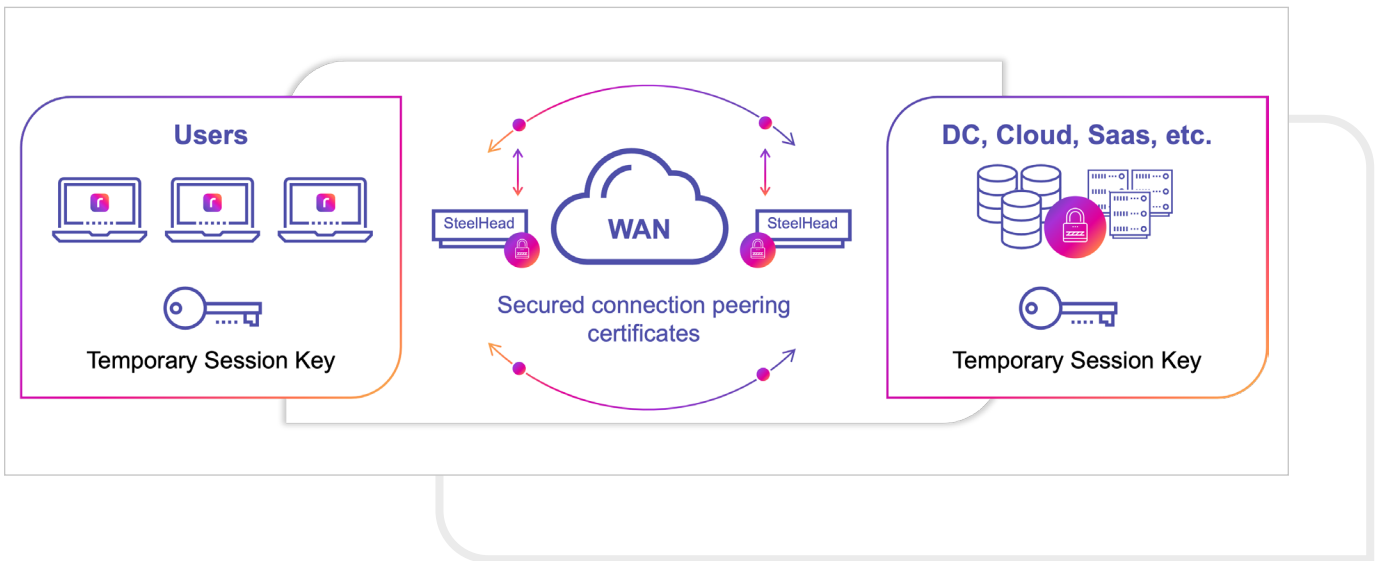
## Cloud Accelerator

Cloud deployment and migration depend on quick, secure delivery of workloads. **Cloud Accelerator** uses SteelHead’s WAN optimization to optimize the cloud-based transfer of files and workloads to applications. As a result, organizations can accelerate cloud migration, meet or exceed cloud backup SLAs, reduce data egress costs, and stabilize the performance of cloud workloads while preserving security – eliminating unpredictable cloud performance and allowing for greater dependency on cloud services. The product is available on Azure and AWS marketplaces.



## SaaS Accelerator

**SaaS Accelerator** offers end-to-end acceleration and performance measurement of leading enterprise SaaS applications, including Microsoft 365, Salesforce, ServiceNow, Box, Microsoft Dynamics CRM, and more. This cloud-based, fully managed service accelerates SaaS application performance by overcoming network inhibitors such as latency, congestion, and the unpredictable user experiences of today’s mobile workforce.



**Figure 2:** Riverbed enhanced SSL/TLS network acceleration solutions





# Riverbed SSL/TLS WAN Acceleration deployment models

Riverbed SteelHead appliances can provide complete latency and bandwidth optimization for SSL/TLS encrypted traffic. Riverbed Acceleration solutions act as a trusted man-in-the-middle (MITM), transparently decrypting accelerated traffic, performing the relevant application acceleration, and then re-encrypting the traffic. This process requires the appropriate SSL/TLS certificates and private keys to be collected, created, or distributed.

To overcome the security and logistical challenges of implementing SSL/TLS optimization in different environments, Riverbed offers three deployment models that deliver full-latency and bandwidth optimization while keeping the data secure in transit and meeting security requirements. Below, we introduce these three options along with the advantages and requirements of each.

## Upload certificates on SteelHead appliances

The first option requires manually collecting and uploading certificates and keys onto SteelHead appliances. This approach will look familiar to many network and security teams, as it is very similar to the one needed by other network appliances, like firewalls.

The Riverbed [SteelCentral Controller \(SCC\)](#), which helps simplify and manage SteelHead deployments, can be used to upload the certificates on multiple SteelHead appliances. SCC can also be leveraged as a certificate authority (CA) to sign peering and proxy certificates.

As this deployment model gives the most control over SSL/TLS certificates and their lifecycle, it meets requirements for customers with higher security requirements.

### Advantages:

- Familiar workflow to other IT equipment (firewalls, load balancers, and proxies)
- Full control over certificates

### Requirements:

- Manual certificate lifecycle management

## Simplified SSL/TLS

Riverbed Acceleration solutions can fully automate the lifecycle management of encryption certificates and keys. By leveraging Client Accelerator as an “SSL Agent” on the user’s endpoints, the solution provides zero-touch acceleration of any SSL/TLS-encrypted app without collecting, creating, or distributing encryption certificates and keys.

Simplified SSL/TLS is also easy to maintain regardless of the number of applications an organization needs to optimize. Users can easily control what software needs to be optimized, accelerated, or bypassed to preserve privacy for specific traffic classes.

### Advantages:

- Zero-touch solution to unlock SSL/TLS optimization
- Supports client authentication, including CAC/PIV cards on MS Windows endpoints

### Requirements:

- A lightweight agent on endpoints

## KeyStone Auto Signing

KeyStone Auto Signing is another option to automate the lifecycle management of encryption certificates and keys, similar to Simplified SSL/TLS. KeyStone Auto Signing does not require the deployment of Client Accelerator on the endpoints. Instead, customers must add the signed CA certificate to the endpoint trust store.

Two options are available for the signing CA certificate: it can be generated on SteelHead as a self-signed CA certificate or an existing CA certificate and its private key can be imported.

### Advantages:

- Flexible deployment options with centralized or distributed signing service
- Local signing service can speed connection setup times
- Site-specific security policies can be met

### Requirements:

- CA certificate must be included in the endpoint trust store

# Benefits of Riverbed's SSL/TLS WAN acceleration

Once you've selected a deployment model, Riverbed WAN acceleration solutions employ several advanced WAN optimization techniques to dramatically improve the performance of several protocols and applications over the WAN:

## Transport streamlining

Riverbed's WAN Acceleration solutions use a set of standards-based and proprietary techniques to optimize TCP traffic, which allows for:

- Efficient retransmission methods to be used (such as TCP selective acknowledgments)
- Negotiation of optimal TCP window sizes to minimize the impact of latency on throughput
- Maximal throughput across a wide range of WAN links

## Data streamlining (data deduplication)

Riverbed uses traditional data compression algorithms alongside proprietary Scalable Data Referencing (SDR) to significantly reduce bandwidth load by removing redundant data off the wire.

## Application streamlining

To address application chattiness, Riverbed WAN Acceleration solutions use application-specific modules to reduce the number of times data must be sent across the WAN, dramatically improving application performance and response time.



## Case Study: Riverbed SSL/TLS traffic optimization in action

The Department of Defense (DOD) found that they were dealing with crippling latency, reduced application performance, and poor end user experience across its distributed, complex networks.

With 85% of their traffic encrypted using SSL/TLS protocols and the performance demands of mission-critical users, the DOD leveraged Riverbed's Acceleration solutions to simplify the authentication process of SSL/TLS traffic.

The result: the DoD significantly reduced latency and unlocked network capacity, increasing their satellite bandwidth capacity by nearly 3x.

These technical benefits also translate into organizational improvements such as:

- **Improved application performance for the end user.**  
Fast, responsive applications are fundamental to minimizing wait time and maximizing productivity.
- **Increased employee satisfaction and productivity.**  
Improving employee satisfaction can boost retention rates, helping organizations avoid resource gaps. The increase in productivity can also boost overall revenue across the organization.
- **Increased IT savings by reducing network and infrastructure costs.**  
Optimizing bandwidth usage eliminates the need to purchase additional bandwidth and lowers IT operational costs as less network support is needed. In our DEX survey, 36% of IT decision-makers identified budget constraints as a major obstacle to delivering an excellent digital experience. With the money saved from WAN acceleration, companies can reallocate funds and continue improving their employees' digital experience.

# Conclusion: A best-in-class solution for optimizing SSL/TLS traffic

Businesses today rely heavily on a large number of applications for their operations. Assuring the performance of these applications is crucial to supporting a fast, consistent digital experience, which is critical to enterprise productivity and talent retention.

Most of these applications exchange data over the WAN encrypted with SSL/TLS, making them susceptible to network latency and congestion, which are detrimental to application performance.

Riverbed's Acceleration solutions provide industry-leading performance for accelerating SSL/TLS-encrypted data transfers. They are the only solutions that optimize and accelerate SSL/TLS traffic and apps without the need to collect, create, or distribute encryption certificates and keys.

Ready to accelerate your applications and improve your user experience? If you are a current customer or new to Riverbed and want to learn more, [please get in touch with us here](#).



## Riverbed – Empower the Experience

Riverbed is the only company with the collective richness of telemetry from network to app to end user that illuminates and then accelerates every interaction so that users get the flawless digital experience they expect across the entire digital ecosystem. Riverbed provides two industry-leading solutions: the Riverbed Unified Observability portfolio, which integrates data, insights, and actions across IT to enable customers to deliver seamless digital experiences; and Riverbed Acceleration, which offers fast, agile, and secure acceleration of any application over any network to users, whether they are mobile, remote, or on-premises. Together with our thousands of partners, and market-leading customers across the world, we empower every click, every digital experience. Learn more at [riverbed.com](https://riverbed.com).