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WHITE PAPER

Accelerating AI and Data Movement at the Edge

Integrating Edge Data with Superior Performance, Security and Agility

Contents

Executive Summary

Edge computing is a transformative approach to data processing that brings computation closer to where data is generated, such as sensors, devices, and users. This proximity significantly reduces latency and enhances the speed and efficiency of data handling.

Edge computing offers numerous benefits, but it also presents several networking challenges that need to be addressed for optimal performance. Among these are bandwidth, latency and security. Addressing these challenges requires innovative solutions and continuous advancements in network technologies to fully leverage the potential of edge computing. This paper looks at ways you can overcome these obstacles so you can harness the power of edge computing for faster decision-making, enhanced security, and improved performance across various applications.

Edge AI Is a Two-Way Street

Edge Computing enables businesses to perform complex operations at places of production by placing compute resources closer to users and operations. This is especially true for applications requiring real-time AI processing and low latency, enabling fast decision-making at the location where it can have the greatest impact.

The Edge does not operate stand-alone – it requires data from the core, either data centers or cloud-based services, to support the locally generated data. While data generated at the edge is processed locally, the relevant information is sent to central systems for further analysis, storage, or complex processing tasks. These central systems can then send back processed data, updates, or instructions to the edge devices, ensuring they operate with the most current information and can adjust their operations accordingly. Thus, the flow of data in edge computing is bidirectional.

In essence, edge computing is about making data processing more efficient and responsive by bringing it closer to the source of data generation, while still benefiting from the advanced capabilities of centralized systems. In AI-powered operations, edge data is often aggregated across multiple locations and analyzed in a data center or cloud for updating operational models. These models and data are then returned to the edge for enhanced accuracy.

This continuous exchange of data between edge devices and central systems supports real-time processing, bandwidth optimization, enhanced decision-making, and scalability. Edge computing leverages the strengths of both local and centralized processing, creating a responsive and efficient infrastructure that can handle large volumes of data generated by numerous edge devices. This synergy is what makes edge computing a powerful tool for modern applications.

Edge Computing Still Poses Challenges

While there are clear advantages of using edge computing, they are also creating more and more silos of data. For organizations trying to gain the most of their data for holistic insights, data silos can be the enemy of successful AI projects. Organizations are increasingly interested in aggregating edge data. This can lead to more accurate and holistic AI models so organizations can make better-informed decisions to positively impact all divisions and the organization as a whole.

By 2030, Statistica projects more than **50% of data will be processed at the edge**, while the market for Edge AI is projected to surge from roughly $34 billion in 2024 to **more than $700 billion** in 2033.

As edge computing generates a significant amount of data that needs to be moved and aggregated, network bandwidth can become strained. Efficient data transfer between edge devices and central servers is crucial to avoid bottlenecks and ensure smooth operations.

Another critical issue is latency, however, achieving consistently low latency can be challenging, especially when considering the physical distance between edge devices and central servers, which can introduce delays and can negatively affect application performance.

Because of this latency, operations reliant on real-time access to critical business data may face delays that slow down workflows, ultimately reducing business efficiency. This is particularly true in AI-enabled environments, disruptions in network connectivity can prevent timely results, inhibiting business-critical local decision-making causing significant negative impacts.

For example, financial institutions share real-time data and insights across locations and collaborative networks to identify and respond to new fraud trends more effectively. By pooling data from multiple sources, AI can perform more comprehensive, **cross-institutional analyses** that might not be apparent when looking at data from a single location. These data and model updates can then be sent back to the edge sites to stop evolving fraud attempts. Data latency can delay fraud detection, increasing losses and potentially increasing risks.

Industry Edge Use Cases

Aggregating data and returning it to the edge to detect and prevent:

Insurance	Healthcare	Retail	Telecommunications
Fraudulent claims.	False billing and prescription fraud.	Shoplifting and returned goods fraud.	Subscription fraud and call spoofing.

Security and Scalability

Security concerns are also paramount in edge computing. With the rise of IoT devices, securing data at the edge is essential to prevent vulnerabilities and attacks. Implementing robust security measures across a distributed network can be complex and resource-intensive, requiring continuous advancements in security technologies.

Scalability poses another significant challenge. As the number of edge devices increases, managing and scaling the network infrastructure becomes more difficult. Efficiently allocating resources to handle varying workloads at the edge is essential for maintaining performance and ensuring that the network can grow without compromising efficiency.

SteelHead RS Improves Edge Computing Data Movement

SteelHead RS is a solution for edge computing that ensures resilient edge data delivery and synchronization. The solution supports secure, centralized data management and ensures high performance at the edge, delivering a seamless experience across distributed environments. even during network outages or degradations. This solution is designed to improve productivity for edge users and maintain business continuity by keeping copies of critical data at the edge and providing near real-time synchronization between the edge and central data centers or cloud servers.

Performance

Riverbed's SteelHead Acceleration, powered by the new RiOS 10 software, delivers exceptional performance for data movement from edge to data centers and cloud environments.

One of the key benefits of SteelHead RS is its ability to optimize data transfer performance, achieving speeds up to 100 times faster. This acceleration is crucial for applications that rely on real-time data processing and decision-making. By caching frequently accessed data locally, SteelHead RS ensures that edge devices can operate efficiently without constantly needing to retrieve data from central locations.

How SteelHead RS Works

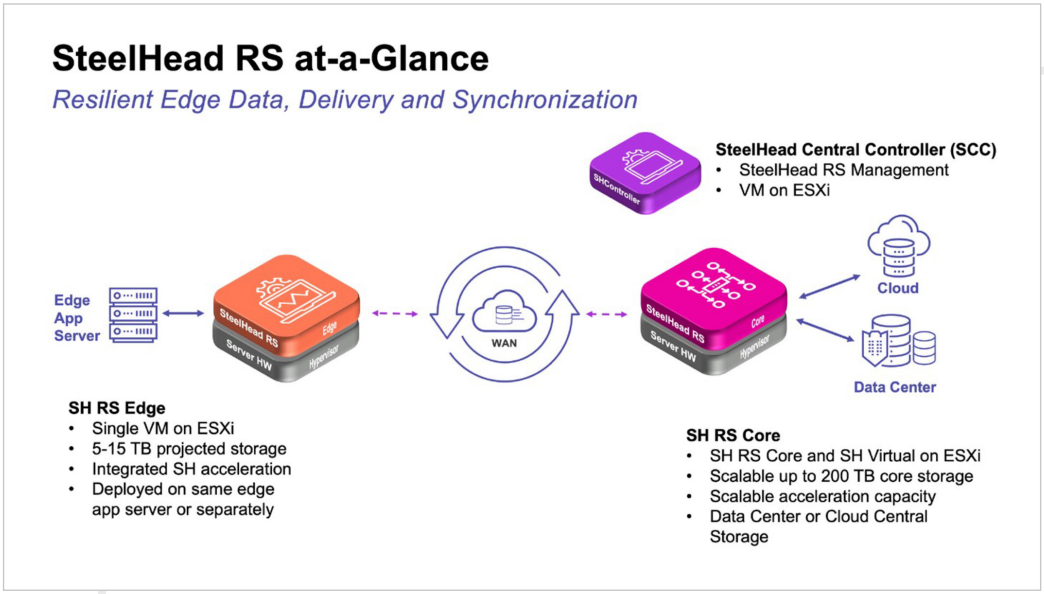

Figure 1: Drive peak performance and bolster data security for edge computing environments.

Agility and Visibility

SteelHead RS empowers efficient and secure edge processing even in the event of network outages or degradations. The solution improves both productivity for edge users and enables business continuity. SteelHead RS does so by maintaining copies of business-critical data at the edge and providing near real-time data synchronization between the edge and the datacenter. If there is a problem with the network that interrupts this process, edge users can continue to work with the most current data until the disruption is resolved.

Finally, SteelHead RS supports visibility and AI operations, enabling organizations to monitor and manage their edge environments effectively. This visibility is essential for disaster recovery readiness, as it helps reduce data loss and ensures that critical business applications and data are delivered at peak performance across any network.

The Next Move Is Yours

Riverbed is dedicated to enabling IT organizations to accelerate performance and transform data into actionable insights to drive seamless digital experiences. SteelHead RS is part of the Riverbed platform, which provides optimization and observability to improve user experience and drive business resiliency. Our platform ensures applications run faster and more reliably for users anywhere and enables IT to prevent, identify, and resolve issues.

Discover more about how SteelHead RS can enhance your edge networking capabilities and support business continuity. Contact a Riverbed expert or visit us at riverbed.com to learn more.

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About Riverbed

Riverbed, the leader in AIOps for observability, helps organizations optimize their user's experiences by leveraging AI automation for the prevention, identification, and resolution of IT issues. With over 20 years of experience in data collection and AI and machine learning, Riverbed's open and AI-powered observability platform and solutions optimize digital experiences and greatly improves IT efficiency. Riverbed also offers industry-leading Acceleration solutions that provide fast, agile, secure acceleration of any app, over any network, to users anywhere. Together with our thousands of market-leading customers globally – including 95% of the FORTUNE 100 – we are empowering next-generation digital experiences. Learn more at riverbed.com.