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COMPETITIVE BRIEF

Riverbed vs. Juniper WXOS/JWOS

Introduction

More than 15,000 customers have purchased and deployed Riverbed® WAN optimization solutions in their production networks. Although Juniper WAN optimization products pre-date the Riverbed offering (through Peribit, a company acquired by Juniper), they have never received the same level of acceptance as the Riverbed Steelhead solution. Today, Riverbed is the market leader while Juniper is a laggard in the WAN optimization market.

Juniper WXC Product Overview

Juniper first entered the WAN optimization market in 2005 through the acquisition of Peribit. With the acquisition, Juniper was considered a leader in WAN optimization by most analyst firms. But Juniper failed to invest in their WAN optimization products, which remained largely unchanged until recently. As a result, Juniper quickly lost their leadership position and they now considered an insignificant vendor in the WAN optimization market with no measurable market share.

In May of 2009, Juniper discontinued the original WX-line of products while continuing to offer the WXC disk-based appliance product Later that year, Juniper introduced the JWOS version 6.x product, which only optimizes traffic for software clients. The JWOS was later also offered as part of Junos Pulse, Juniper's security and VPN offering for software clients. But customers needing appliance-based WAN optimization products for branch offices still must use the old WXC series appliances running older version 5.7 software in order to obtain site-to-site optimization of WAN traffic.

Today, Juniper's WAN optimization offering is fragmented between two completely different and incompatible products. Site-to-site traffic must be optimized through WXC appliances running WXOS version 5.7 or earlier, while mobile software client traffic must be optimized through a data center-resident appliance running JWOS version 6.2. A customer with WAN optimization requirements for both mobile software clients and remote sites will need two sets of data center WXC appliances—one running WXOS 5.7 and another running JWOS 6.2.

Juniper WXC lacks application-specific optimizations

The ability to address latency and other protocol-specific issues for a wide range of different applications distinguishes Riverbed's WAN optimization solution from other vendor offerings. Juniper's two WAN optimization products significantly lag Riverbed in this area, and this is a key reason why they have lost market share despite originally being an early pioneer of WAN optimization technology.

The following table compares application-specific optimization capabilities for Riverbed, Juniper WXOS 5.7 and JWOS 6.2. Juniper recently added optimization for unencrypted MAPI—a capability that Riverbed first introduced back in 2004—to their JWOS product

Riverbed Advantages

More Applications

- Application-specific optimization for SMBv2, encrypted Exchange, Mac CIFS, Lotus Notes, encrypted Lotus Notes, NFSv3, MS-SQL, Citrix ICA, and Oracle Forms, FCIP, and SRDF--all not available from Juniper

Unique Capabilities

- RiOS Services Platform enables the delivery of branch office services without the need to deploy a dedicated server
- High-Speed and Maximum-Speed TCP enhancements for high-bandwidth or loss-prone networks

Ease of Deployment

- Autodiscovery for site-to-site optimization automatically forms connections as needed to all Steelhead appliances deployed in a network
- Choice of WAN visibility modes – customers can choose between correct addressing, port transparency, and full transparency
- Same data center appliances can be used to optimize mobile clients and for remote branches

Greater Scalability

- Unified data store provides storage efficiency and scalability for large deployments
- Superior fan-out scalability—one Steelhead appliance can connect to thousands of remote Steelhead products

Security

- Unlike Juniper WXC appliances, Riverbed offers data store encryption. Protection extends to all optimized traffic, including to data sent through SSL.
- Juniper WXC appliances potentially allow encrypted data to be sent in the clear over the network

(which only supports software clients). Nevertheless, the wide disparity in application-level optimization capabilities reflects the fact that Juniper has exerted little effort to improve and develop their WAN optimization products. Specifically, the application-level optimization capabilities of Juniper's WXOS product have been unchanged for a number of years--no layer-7 capabilities have been added to the WXC appliance product since 2007.

	CIFS	CIFS Signed	SMBv2	Mac OSX CIFS	Windows Print	Exchange 2003/2007/ 2010	Encrypted MAPI	Lotus Notes	HTTP	SSL	Oracle Forms (11i and 12)	NFS	Citrix ICA	MS-SQL	FCIP/SRDF
Riverbed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Juniper WXOS 5.7 (for appliances only)	✓	partial (see below)	✗	✗	✗	✗	✗	✗	✓	security risks (see following section)	✗	✗	✗	✗	✗
Juniper JWOS 6.2 (for software clients only)	✓	partial (see below	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗

Note that Juniper WXOS 5.7 and JWOS 6.2 capabilities for CIFS signed traffic actually weaken the protection offered by Microsoft's SMB signing feature, by surreptitiously removing signing between the Windows client and WXC device. Riverbed SMB signing optimization maintains end-to-end signing between the client and server – a pre-condition for security-conscious organizations that need to optimize their signed CIFS traffic. Furthermore, unlike with Riverbed, Juniper SMB signing optimization does not work when the client has signing set to 'Required' – a setting that is mandated by US Federal specifications.

SSL optimization for WXC appliances has serious security risks

Juniper WXC products lack any ability to encrypt the data stored in its disk drives. Data that was formerly encrypted through SSL, potentially including credit card numbers, personal employee information, and proprietary corporate information, must all be stored in clear-text format on the WXC devices. While the end-user may believe this information is being securely and confidentially transferred over the WAN, in reality the data is exposed to anyone with access to the disk drives of the WXC device. Hot-swappable disks on some platforms make it possible for an intruder to remove the disk drives and steal the unencrypted data without even opening the chassis. In a small branch office where few employees are present on evenings or weekends, this leads to an unacceptable security risk. With Riverbed, customers do not have to store encrypted data in the clear, as Steelhead appliances offer data store encryption capabilities based on the AES encryption algorithm.

Use of IPSec in Juniper WXC appliances for optimized SSL traffic can lead to problematic situations if the IPSec tunnel is not successfully established, due to IPSec peering failure (e.g., due to expired security credentials or mis-configuration), or remote device failure. In such a situation, SSL traffic that was previously optimized will be blocked by the Juniper device, because it has no secure channel over which to send the data. The only way for an administrator to prevent such service interruptions is to configure the IPSec tunnel with the "encryption optional" setting. With this setting, optimized SSL traffic will continue to be sent, but over an *unencrypted* tunnel in the event of an IPSec failure – defeating the purpose of using SSL in the first place. Juniper SSL "optimization" thus forces the user to choose between two very unattractive failure modes: either blocking the traffic completely, or exposing it openly to inspection and attack. Naturally, for any sensitive business-critical traffic, Juniper SSL optimization is useless.

Riverbed's SSL optimization avoids both the interruptions and the security vulnerabilities of Juniper's approach: if a remote device or SSL peering fails, previously-optimized SSL traffic will continue to be sent encrypted (and of course, un-optimized) using end-to-end client-server SSL sessions.

WXC Appliances are underpowered

Juniper's hardware appliances are underpowered. Each WXC device uses a 32-bit operating system supporting a maximum of 4GB of RAM memory. The maximum WAN throughput by the largest Juniper appliance is only 45Mbps, which is clearly inadequate for many of today's networking environments.

Juniper previously attempted to address the scalability issues by offering a "WXC Stack" configuration which attempts to cluster up to six WXC devices around a WX-100 device. However, this approach is no longer available because WX product line (including the WX-100 device) has been discontinued. Juniper's only scaling option is through use of WCCP, which has its own scaling limitations.

There are also scalability constraints to Juniper's offering for mobile users. Juniper's largest appliances—MAG-SM361—can provide

optimization for at most 1000 mobile software clients. In contrast, a single Steelhead 7050 can support as many as 10,000 mobile users.

In the case of site-to-site WAN optimization, Riverbed again offers superior scalability. The following table compares resources available in the largest physical WAN optimization appliances available from Riverbed and Juniper.

	Riverbed Steelhead 7050	Riverbed Steelhead 6050	Juniper WXC-3400
Operating System	**64-bit**	**64-bit**	**32-bit**
RAM	**48 GB**	**24GB**	**4 GB**
Disk Capacity (raw)	**4.4 TB**	**8TB**	**1 TB**
Max Fan-out (peer devices)	**4096**	**4096**	**140**
WAN throughput	**1Gbps**	**310Mbps**	**45Mbps**

Juniper's per-peer data store vs. Riverbed's unified data store

In addition to the hardware limitations of the Juniper WX/WXC devices, the Juniper offering also suffers from software-related architectural issues that cause system-wide scaling difficulties. Specifically, Juniper uses a fragmented data store architecture, which stores a separate instance of data for communication through each tunnel. The result is a very inefficient use of storage in the data center core WXC device. For example, where users at 10 different branch offices retrieve the same file from a central file server, the data center core WXC device must store data for the relevant file 10 separate times—once for each remote WXC device.

Juniper has tried to explain away the inefficiencies of their data storage architecture by stating that customers should not be concerned with how rapidly the data store fills up. Customers cannot even monitor this issue – Juniper has omitted from the WXC management interface all information concerning disk usage, hiding key disk storage utilization statistics from the administrator.

In contrast, Riverbed's data streamlining technology uses a universal data store that does not store and organize data separately for each peer Steelhead appliance. So in the case of an identical file fetched by 10 different branch offices, the relevant data will be represented only once at the core Steelhead appliance in the data center, not 10 times. The data transfer to every peer Steelhead at each remote branch office leverages the same instance of data in the data center Steelhead appliance.

Juniper's unidirectional data store vs. Riverbed's bidirectional data store

Another key difference is that the Juniper WXC appliance has a one-directional data store, while Riverbed's data store is bi-directional. In order to achieve bi-directional acceleration, the Juniper WXC device must store all data twice—once for each direction of data movement. In contrast, Riverbed has a single unified data store that is used for bi-directional acceleration. This is achieved after storing only a single instance of the data in the Steelhead appliance's data store.

For more details on these data store scalability issues, see the Riverbed white paper "Storage efficiency in WAN optimization solutions: Why it matters and what you need to know."

Visibility and Reporting

The Juniper WXC product uses a tunneling approach that negatively affects visibility and reporting for all optimized traffic. Because all network traffic optimized by the WXC device is encapsulated into an opaque tunnel between the communicating Juniper devices, network reporting devices are unable to distinguish the different application traffic flows or provide meaningful reporting information on the network traffic.

In contrast, Riverbed uses a transparent TCP proxy architecture that preserves the integrity and visibility of each and every optimized TCP traffic flow. An optional network transparency feature preserves source and/or destination IP addresses and port numbers in any or all of the optimized TCP connections. In addition Riverbed supports SNMPv3, Netflow version 9, and XML/SOAP API's, which are not available in the Juniper WXC product.

Riverbed also offers Cascade, a separate product that provides advanced analysis tools, including analytics and dependency mapping. Behavioral analytics represent a new generation of reporting capabilities that dynamically adjust alerting thresholds based on historical learned behavior, while interactive dependency mappings significantly improve troubleshooting capabilities and workflow planning by clearly illustrating user/application, application/server, and server/server dependencies. A survey of Cascade customers by IDC found that the average MTTR for network problems dropped from 12.8 hours to 2.1 hours after Cascade was deployed. IDC also recorded multiple

anecdotal reports that Cascade alerted administrators to performance and security problems before users did. Although Exinda may attempt to automatically maintain specified performance policies and service levels, it lacks Cascade capabilities to recognize, find, and fix problems that arise.

Key Riverbed Capabilities Not Available in Juniper WXOS 5.7 (and earlier releases)

The following is a compilation of Riverbed features that are not available in the Juniper WXC appliance using WXOS 5.7 software:

Autodiscovery – Riverbed appliances automatically find each other in the course of normal client/server connection setup. Unlike Juniper appliances using WXOS 5.7, Riverbed Steelhead appliances do not need to be manually connected to each other with tunnels. Riverbed's autodiscovery capability reduces the cost and difficulty of deployment, especially as the size and complexity of the network increases.

WAN addressing flexibility. Riverbed provides flexibility for organizations that want to enable end-to-end transparency of WAN traffic by IP address and port or by port only. Steelhead appliances enable full IP or port-only address visibility on the WAN for optimized connections in addition to their default Correct Addressing mode. With three visibility modes to choose from, customers can select the appropriate mode of operation for their network without making broad-sweeping architectural design changes to implement WAN optimization. Juniper appliances do not have this flexibility, because they use a UDP tunneling architecture.

RiOS Services Platform (RSP). The RiOS Services Platform enables the delivery of branch office services without the need to deploy a full-blown server. RSP allows customers to deploy best-of-breed software on Steelhead appliances in a self-contained partition to minimize the hardware infrastructure footprint at the branch office. Because RSP uses VMware as its virtualization platform, it can host nearly any service imaginable, including security, network monitoring, streaming, and domain controller services. Juniper does not offer any such capability in its WAN optimization products.

Enhanced High availability. Steelhead appliances can be clustered in a variety of ways (serial, parallel, using WCCP, or using Interceptor). Any two clustered appliances can be configured to synchronize their data stores, meaning that data segment vocabulary learned by one appliance in the course of optimization will be mirrored to the other appliance. In case of an appliance failure, the backup appliance will immediately be able to provide full optimization using its already-populated datastore. Such functionality is not available from Juniper, thus precluding true high availability – after a failover event, the appliance taking over will have an empty data store, and all traffic will revert to cold performance, with a bandwidth spike that will last for hours or days, while the new appliance re-learns all the necessary vocabulary.

High-Speed and Maximum-Speed TCP – Riverbed also offers rich support for TCP acceleration that allow customers to achieve application performance as high as 800 Mb/s per device over high-speed WAN links spanning global distances. High-Speed TCP can improve actual throughput of traffic crossing high-bandwidth, high-latency networks; Maximum-Speed TCP offers guaranteed bandwidth usage in the face of packet losses, as for example over satellite links. Juniper does not have these capabilities, and supports a maximum throughput of only 45Mbps through the largest WXC-3400.

Multi-Link Support – Riverbed allows configuration of additional multi-port GigE cards in a single Steelhead appliance, allowing large appliances to support up to 10 separate Ethernet links, and medium appliances to support up to 4 separate links. Since each Juniper appliance only supports a single link, any network with multiple parallel links forces the purchase of multiple appliances.

Fiber Interfaces – All but the smallest Riverbed Steelhead appliance models can be optionally configured with fiber interfaces. In contrast, the only way Juniper's WXC appliances can be connected into a fiber-optic network is through use of the WX-100-based appliance "stack." Even in this configuration, Juniper does not support a fail-to-glass (optical fail-to-wire) interface; Riverbed does.

Citrix ICA – Riverbed offers the ability to dynamically disable the default encryption and compression in the XenApp presentation server so that the Steelhead can optimize the raw Citrix ICA data. Manual reconfiguration of the XenApp server is not necessary—disabling of the encryption and compression is handled automatically as long as Citrix ICA optimization is enabled in the Steelhead management interface. In addition, each Steelhead is also able to unwrap the four encoded Citrix ICA virtual channels and individually apply QoS policies to each channel. This allows Riverbed to deliver enhanced Quality of Service for Citrix ICA traffic over the WAN. Juniper offers none of the above capabilities.

Solid State Disks (SSD's)

SSD technology offers significantly faster I/O performance for the disk subsystem, a critical component of WAN optimization devices that persistently store repetitive byte-level data patterns. Riverbed has performed the significant hardware engineering required to integrate SSD technology into its appliances, and offers high-end Steelhead models that store 100% of their persistent byte-level data on SSD-based storage. This technology is not available from Juniper.

Virtual Appliance

Riverbed's Virtual Steelhead offering provides the option of hosting Steelhead software on any hardware platform. The Virtual Steelhead

solution offers a new option for deploying Riverbed's best-of-breed WAN optimization technology. In contrast, Juniper does not offer a virtualized edition of their WXC product.

Cloud-based Product

For customers planning to move applications to the public cloud, Riverbed offers a Cloud Steelhead product for Amazon EC2. Like all Steelhead products, Cloud Steelhead interoperates with Steelhead appliances, Steelhead Mobile, and Virtual Steelhead, giving organizations maximum flexibility to optimize network traffic regardless of how users and data are distributed. In contrast, Juniper does not offer a Cloud-based WXC product.

Key Riverbed capabilities missing from Juniper JWOS 6.2

Juniper's JWOS 6.2 offering has the following weaknesses when compared to the Riverbed Steelhead Mobile solution:

No location awareness or coordination with WXC appliances – There is no coordination between WX clients using JWOS 6.2 and WXC devices using WXOS 5.7 (and earlier) appliances. Consequently, there is a potential conflict for a WX client that powers-up in a branch office equipped with a WXC appliance running WXOS 5.7 (and earlier) software. This creates an additional configuration and maintenance burden, because the administrator will need to enumerate all IP subnet ranges that each WX client must not optimize traffic for, in order to avoid conflict between JWOS and WXOS products. In contrast, Riverbed Steelhead Mobile client auto-detects a local client-side Steelhead appliance, and can defer optimization responsibilities to that Steelhead appliance when the mobile user is working in a Steelhead-equipped branch office.

No data sharing between WX Client and WXC appliances – Riverbed offers a data store sharing capability between Steelhead Mobile Clients and Steelhead appliances known as "Branch Warming." Through this feature, Steelhead Mobile is able to share and learn about data patterns by communicating with the local Steelhead appliance that may be co-resident in the branch office. Any files downloaded by the user while in the Steelhead appliance-equipped branch office are learned by the Steelhead Mobile software client. As a result, accelerated performance is achieved even when the end-user returns to their home office and uses Steelhead Mobile to access the same or similar files previously accessed in the branch office. Juniper's WX client lacks any capability comparable to Riverbed's "Branch Warming" feature.

No Macintosh support – Riverbed Steelhead Mobile can be installed on all supported Windows releases as well as Apple Macintosh OSX version 10.5, 10.6, and 10.7. The Juniper WX client lacks support for Apple Macintosh platforms.

SUMMARY

Riverbed remains the technology leader for WAN optimization solutions that accelerate a broad range of TCP/IP-based network applications over the WAN, as demonstrated by its installed base and market acceptance. Riverbed's leadership is reflected in its more extensive product capabilities and superior performance.

Despite being an early pioneer in WAN optimization technology, today Junper is considered an insignificant vendor in the WAN optimization market. While continued innovation has allowed Riverbed to extend its lead, while Juniper's WAN optimization products have stagnated.

Juniper's WAN optimization solution is fragmented between two different and incompatible software releases. Juniper's WXOS software is used for site-to-site traffic optimization, while their JWOS software is used for mobile software clients. These two software versions use different architectures and are completely incompatible. Customers needing WAN optimization for both branch offices and software clients must deploy two separate sets of Juniper appliances in the data center.

Juniper's application-specific optimization capabilities are very weak. Due to neglect and lack of investment in their WAN optimization products, Juniper's offering lacks most of the application-level capabilities available in the Riverbed Steelhead offering.

Juniper's WXC appliances are underpowered and lacking in hardware resources. The largest appliance only supports 45Mbps of WAN throughput. Clustering options are very limited.

Juniper's per-peer data store creates scalability problems in larger deployments. As the number of remote sites grows, the available data store for optimizing traffic to each site shrinks. As the size of the deployment grows the effectiveness of Juniper's product decreases.

The Juniper WXC appliance SSL optimization capability is insecure because it stores previously-encrypted confidential data in clear-text format on the WXC device's hard drives. An intruder in the branch office can potentially steal the WXC device's hard drives.

About Riverbed

Riverbed Technology is the IT infrastructure performance company. The Riverbed family of wide area network (WAN) optimization solutions liberates businesses from common IT constraints by increasing application performance, enabling consolidation, and providing enterprise-wide network and application visibility – all while eliminating the need to increase bandwidth, storage or servers. Thousands of companies with distributed operations use Riverbed to make their IT infrastructure faster, less expensive and more responsive. Additional information about Riverbed (NASDAQ: RVBD) is available at www.riverbed.com

riverbed®
Think fast.™

Riverbed Technology, Inc.
199 Fremont Street
San Francisco, CA 94105
Tel: (415) 247-8800
www.riverbed.com

Riverbed Technology Ltd.
Farley Hall, London Rd., Level 2
Binfield
Bracknell. Berks RG42 4EU
Tel: +44 1344 354910

Riverbed Technology Pte. Ltd.
391A Orchard Road #22-06/10
Ngee Ann City Tower A
Singapore 238873
Tel: +65 6508-7400

Riverbed Technology K.K.
Shiba-Koen Plaza, Bldg. 9F
3-6-9, Shiba, Minato-ku
Tokyo, Japan 105-0014
Tel: +81 3 5419 1990