TANEJA GROUP
TECHNOLOGY ANALYSTS

P R O D U C T P R O F I L E

Riverbed Raises the Ante Again in WDS with RiOS 5.0

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THE NET NET

In distributed enterprises, a majority of employees work outside of major data center locations. Mobile workers with laptops may attach to corporate networks through the internet from anywhere, and remote office and branch office (ROBO) workers typically require a certain amount of IT infrastructure to meet their local computing requirements. If there's one thing that all of these workers share, it's a desire for high performance computing. This gave rise to the wide area data services (WDS) market in the 2004-2005 time frame, with its promise of providing LAN-like performance across wide area networks (WANs). WAN acceleration products, which shipped earlier than 2004, really provided a subset of the functionality that WDS products do, and WDS solutions present a much more comprehensive approach to solving the WAN performance issue for distributed enterprises.

WDS is rapidly becoming an indispensable solution in distributed environments. Taneja Group forecasts that WDS will be close to a $2B market in 2010. Riverbed was a pioneer in the WDS space, introducing their first products in 2004. Over the last three years, Riverbed has innovated at an aggressive pace, continually pushing the edge of WDS functionality with many industry firsts and challenging competitors to keep pace. End users have clearly benefited from the arms race between Riverbed and the other WDS suppliers, including Cisco, Juniper, Packeteer, Silver Peak, and Blue Coat. With the latest release of RiOS, the software that powers Riverbed's Steelhead WDS appliances, they have raised the ante yet again. In the RiOS 5.0 release, Riverbed provides a number of incremental improvements across major areas of WDS functionality along with another industry first, a major strategic platform announcement in the form of the RiOS Services Platform (RSP). Existing Riverbed users will want to consider upgrading over a three to six month period, with Exchange 2007 users possibly targeting an earlier deployment. For new customers considering WDS, Riverbed's industry leading functionality should put them on your short list.

State of the Art in WDS Today

The first WDS products became available in 2004. Simply defined, WDS products use a variety of data acceleration techniques to provide LAN-like performance across WANs. WDS appliances are deployed in local and remote sites, significantly decreasing the amount of traffic that traverses the network to perform any given workload. WDS has far reaching implications for IT in terms of cost reduction and administrative simplification in ROBO management, and has been widely deployed in the Fortune 5000 over the last several years. Taneja Group has forecast that this high growth category will be close to a $2B market in 2010.

Baseline functionality for WDS products include technologies that reduce the overall amount of data that must be sent (data de-duplication) and/or reduce the number of round trips required to send it. Optimizations vary based on workload and protocol specifics, but today's best solutions focus on applications that are commonly used by remote workers as well as large, sequential data transfers such as those used in transferring backups between data centers for enterprise DR purposes. The leading solutions also leverage TCP-based protocols for optimization to ensure compatibility with other WAN traffic, covering a wide range of popular application protocols. Solutions are deployed in-band on IP networks, and support fail to wire capabilities for high availability purposes. The degree of optimization varies by workload and vendor, but it is reasonable to generally expect a 1.5x – 6x capacity increase in terms of WAN bandwidth and more than 60% data reduction for data sent across the WAN for today's most efficient offerings.

The WDS ROI Story

Companies deploying WDS solutions tend to enjoy a common set of benefits, including:

Vastly simplified infrastructure. Much of the local IT infrastructure in place in ROBO locations was installed to meet local performance requirements. Across companies as a whole, this represents significant redundancy in terms of mail and file servers as well as local data protection infrastructure. Use of WDS solutions allows much of this infrastructure to be removed and centralized without impacting users' performance perceptions. This translates to immediate cost savings in terms of fewer servers and less storage to maintain, lower power and cooling costs, and possibly even the cancellation of contracts with outside agencies that were picking up and storing backup tapes for remote site locations. It may even allow companies to shut down regional data centers that were installed to meet distributed users' performance requirements.

Lower WAN expenses. If, after deploying WDS solutions, WAN traffic drops considerably, it can significantly delay the need to increase existing WAN bandwidth as companies grow. Many customers have found, in fact, that it allows them to deploy new applications, like VoIP, without having to add any new WAN bandwidth.

More efficient management. When companies move to a more centralized approach, they can leverage the more sophisticated IT expertise that resides at a company's major data centers. This translates directly to better, more efficient management of IT resources as well as less opportunity for operator error.

Better collaboration and improved productivity. Companies can eliminate version control problems, and users can collaborate in real-time using file shares or centralized content management systems as primary storage rather than storing data locally on their laptops. Employees from different offices around the world can be deployed on projects as if they were all co-located without increasing travel expenses.

This can allow companies to take on increased business and staff projects without regard for location.

Riverbed and WDS

Riverbed was the pioneer in the WDS space, first introducing products into this market in 2004. In September 2006, Riverbed went public, achieving what the Wall Street Journal recognized as the highest performing IPO that year. Riverbed's product line includes appliances of all sizes targeted for ROBO locations to large data centers, and a mobile software version of the product for laptop users working on the road. Riverbed products are available from a number of trusted enterprise suppliers including AT&T, BT, EDS, HP, IBM, and Orange Business Services, as well as through a network of global resellers. With over 3500 customers, Riverbed has continued to grow at a rapid pace.

Riverbed has based their success on a simple, two pronged product strategy. First, by taking a comprehensive approach that uses three different types of optimization methods – data de-duplication, transport layer, and application layer acceleration – Riverbed has been able to address the main causes of poor application performance while providing coverage for a very broad spectrum of traffic types. An ability to apply these methods simultaneously greatly reduces the amount of data that must traverse the WAN to support a distributed workforce and minimizes the latencies associated with many popular network protocols, including CIFS, NFS, TCP, HTTP, FTP, SSL, MAPI, and MS-SQL. Second, Riverbed has focused on ease of deployment and use. Because almost all Riverbed deployments involve distributed environments where there is limited if any IT expertise, this focus has resonated well with Fortune 5000 accounts. These accounts want not only to improve WAN performance but also to deploy solutions quickly and easily, with minimal disruption.

With the previous RiOS release (4.1), Riverbed introduced a dynamic workload sensing capability that could differentiate between workload types (bursty I/O vs large sequential data transfers) and automatically apply a tailored set of optimization methods. Through this unique capability, Riverbed customers enjoy further improved WAN efficiencies, and Riverbed is still the only WDS vendor that offers it.

With the recent introduction of RiOS 5.0 in March 2008, Riverbed has raised the functional bar in the space yet again, extending their industry leadership position. RiOS 5.0 represents a wide set of incremental enhancements to the software that runs on Riverbed's Steelhead appliance family. Enhancements are provided across four major areas that will be discussed in detail later, including performance, scalability, ease of use, and security.

With RiOS 5.0, Riverbed is also opening up their platform to allow third parties to provide their own software modules running on Steelhead appliances at distributed sites. The RiOS Services Platform (RSP) represents a first in the WDS industry, and will combine modules from best-of-breed software vendors with best-of-breed WDS capabilities from Riverbed. At announcement, Riverbed

already has third party vendors writing modules for the RSP that support such areas as unified threat management, IP address management, streaming media, authentication, application performance management, and virtualization.

Evaluating RiOS 5.0

RiOS 5.0 includes performance, scalability, ease of use, and security enhancements that extend Riverbed's technology lead in the market. Here is a quick summary of the enhancements, along with some discussion of their impact.

Performance: Exchange 2007 and Web Application Acceleration. Microsoft Exchange is a widely deployed application, and a business-critical component in companies of all sizes. Microsoft shipped Exchange 2007 in late 2007, and many companies have already deployed it or will be deploying it shortly. With RiOS 5.0, Riverbed is the first WDS vendor to provide layer 7 acceleration for Exchange 2007. In internal testing, Riverbed has seen acceleration of up to 54x and up to 97% reduction in data traffic for Exchange 2007. RiOS 5.0 currently only supports unencrypted mode, but, given the company's track record, expect encrypted mode support by Fall.

Existing Riverbed installations support a variety of web application (HTTP) acceleration capabilities, including data de-duplication and transport layer optimizations, connection pooling to minimize TCP session setup overhead and roundtrips, and URL learning. Features new in RiOS 5.0 include page parse and pre-fetch, metadata acceleration (304 "not modified" fast response), enhanced URL learning (parallel page requests), and DNS caching to improve web response time. When a client pulls down a dynamic web page, the page is parsed for embedded objects such as scripts or images. The Steelhead appliance then goes and pre-fetches those objects to avoid waiting for sequential HTTP requests and acknowledgements, cutting down on round trips over the WAN. When a client sends an request for a web page, the client-side Steelhead appliance can determine if the web page has been modified since it was last requested and if not (this is what generates the 304 response), it will notify the requesting client that they can pull the web page from their local browser cache. This eliminates the roundtrip for all users requesting that content in an office.

Riverbed has enhanced URL learning in RiOS 5.0 to provide support for parallel page requests, an approach which minimizes the number of round trips to service a given web page request. When retrieving a web page, HTTP serially requests each object on the page, which can result in significant latency in presenting the web page. In RiOS 5.0, URL learning has been enhanced so that a Steelhead appliance can "learn" which objects are associated with a given web page, and submit a single request for all of them when that page is requested. This is referred to as a parallel page request. With support for DNS caching on the Steelhead appliances, Riverbed is able to service many DNS requests directly without having to go out across the network. This cuts the number of

round trips required to service DNS requests, improving response time.

An optional Oracle 11i module introduced late last year targeted at optimizing J-initiator socket mode traffic has now been enhanced to include HTTP acceleration; J-initiator socket/native and HTTP mode traffic can now be unscrambled so that data de-duplication and transport layer methods can be applied for increased optimization. Taken together, these enhancements mean further acceleration for ERP, CRM, and CMS application environments such as those based on SAP, Oracle, JD Edwards, Microsoft SharePoint, and Siebel.

Scalability: Hierarchical QoS and more connections. Quality of service (QoS) is one of many tools Riverbed applies to meet WAN performance requirements. Prior to the RiOS 5.0 release, Riverbed supported QoS using the Hierarchical Fair Service Curve (HSFC) to optimize for both bandwidth and latency. In 5.0, Riverbed moves to a hierarchical model which should significantly simplify QoS-based traffic management in complex environments. Through the management interface, QoS rules can be established and filtered by branch, class, or application, making it much easier to understand what QoS rules are applicable in different portions of the network. This visibility gives network administrators the confidence to make adjustments as necessary, with a better understanding of the impact of changes. Up to 4 layers of hierarchy are supported, and each installation can support up to 1000 different QoS classes (from the point of view of the central data center).

Riverbed has also increased the number of optimized TCP connections that are supported in many of their Steelhead appliances, including models 200, 300, 520, 1020, and 1520, by 10%. The appliance line ranges from small and mid-size office models to models targeted at large offices and data centers. The number of connections ranges from 25 on the Steelhead 50 to over 1,000,000 concurrent connections aggregated on the Interceptor 9200. Note that while all models support "fail to wire" capability, any of the models may be clustered for high availability purposes.

Ease of use: WAN Visibility, RSP, and role-based administration. When deploying a WDS solution, customers often have strong opinions concerning whether the solution must be transparent to the network or not. End users typically request transparency thinking that it will ensure that their existing network configuration does not need to be modified when deploying a WDS appliance. The most typical concerns are around preserving pre-existing QoS implementations, traffic monitoring and reporting issues, and intrusion detection and prevention implementations. Transparency is appropriate when customers are interested in WAN-side QoS marking and enforcement of optimized traffic or traffic reporting on the WAN-side of a WDS appliance. However, when deployed inappropriately, transparency can cause problems with firewalls (packets appear as spoofed traffic and/or sequence numbers are out of whack), traffic may be mis-routed, or an organization may not be able to distinguish between optimized and non-optimized traffic (if they want that visibility). In these situations, non-

transparent deployment may be more appropriate.

With RiOS 5.0, Riverbed now gives customers both transparent and non-transparent deployment options. A Steelhead appliance can be deployed in one of three modes: correct addressing, correct addressing with port visibility, and full IP and port transparency. Support for this full range of WAN visibility modes now makes the question of transparent vs non transparent deployment moot. Riverbed is the only WDS vendor to offer multiple visibility modes providing greater flexibility for customers.

The RSP, referred to earlier, is the first offering of its kind in the WDS market. Performance requirements dictate that certain branch services, like IP address management, print server, video streaming, and security services, are run locally at the branch office level as edge services. Typically, each one of these services is deployed on its own hardware platform. Riverbed's RSP strategy is targeted at reducing the branch hardware footprint by allowing "virtualized edge services" to be hosted on the Steelhead appliance. Riverbed has documented, published APIs that allow third parties to create modules designed to run on the Steelhead appliance. As development partners, Riverbed is targeting leading edge services vendors. A virtualized edge service module runs in its own protected partition, isolated from the Steelhead's WDS operations, to ensure that its services are run in a completely secure manner. Although initially each Steelhead appliance can run only one module, this will increase in the future. The RSP strategy supports hardware consolidation at remote sites without loss of functionality, and will decrease costs for floor space, power, and cooling, as well as simplify administration. Riverbed's strategy will allow best-of-breed WDS capabilities to be paired with best-of-breed edge services functionality from familiar, proven vendors.

Role-based administration capabilities provide the flexibility to assign tasks and operations by role, and associate the appropriate access controls by role. With RiOS 5.0 Riverbed offers three levels of access – deny, read, read/write – that provides the administrative flexibility required for widespread deployment in larger enterprises.

To manage access to network resources, Riverbed supported TACACS+ (Terminal Access Controller Access Control System) and RADIUS (Remote Authentication Dial In User Service) in their previous releases. TACACS+ is a protocol that provides access control for routers, network access servers, and other network computing devices via one or more centralized servers. TACACS+ is based on TACACS, but it is an entirely new protocol which is incompatible with previous versions of TACACS. TACACS+ and RADIUS, another protocol for controlling access to network resources often used by ISPs, have generally replaced the earlier protocols in more recently built or updated networks, although TACACS is still running on many older systems. RADIUS is also often used by corporations managing network access across an array of technologies such as modem, DSL, wireless,

and VPNs. Both TACACS+ and RADIUS use the "AAA" (Authentication, Authorization, Accounting) concept to manage access to network resources. In previous releases, Riverbed supported TACACS+ and RADIUS authentication and authorization capabilities, and with RiOS 5.0 is now adding support for accounting, the third leg (if you will) of the AAA concept. Accounting provides an audit trail capability so there is an immutable record of activities performed against the appliance.

Security: SSL acceleration and IPSec enhancements. SSL enhancements in RiOS 5.0 support automatic optimization of SSL traffic, further simplifying configuration and deployment. Auto-discovery of SSL Steelhead peers (with gray list capability) and support for certificate domain wildcards is now also supported, making it easier to administer secure configurations. In Riverbed's SSL trust model, when a peer is auto-discovered, it is placed in a gray list (symbolizing unknown trust); an administrator would then place each peer in a white or black list, depending upon whether they are trusted or untrusted. Support for domain wildcards is an ease of use feature; instead of having to copy each server's SSL certificate separately onto a Steelhead appliance, you can now copy the SSL certificates of all servers in a domain with a single command to an appliance. In addition, Riverbed has now added 3DES and AES 128/256 bit encryption support for IPSec to enable higher security.

Deployment Considerations

While RiOS 5.0 includes much new functionality, it should be viewed as an incremental release that can be considered for immediate deployment. RiOS 5.0 is included at no additional charge for all Riverbed maintenance customers. RiOS updates can be deployed with minimal impact on end users. Updating RiOS does require that Steelhead appliances be rebooted, but because of the "fail to wire" design, network traffic disruption can be minimized. Once the appliance is back up, traffic optimization immediately resumes. However, end users should take note of the potential service disruption so that the RiOS update does not unduly impact business operations.

Even for new installations, many customers can deploy a Steelhead appliance pair in under 30 minutes. Support for centralized management allows virtually plug-and-play configuration of appliances in remote offices.

Taneja Group Opinion

If you are in the market for WDS functionality, you have a very rich set of product offerings from which to choose. You should expect WAN capacity increases of up to 6x and 60-95% data reduction for today's best offerings. Riverbed is currently leading the market in these metrics, and has extended their industry leadership position with RiOS 5.0. If you are looking for a WDS vendor, consider the following:

- Riverbed was the pioneer in the market in 2004, and since then has

racked up a number of industry firsts, including the industry's first TCP proxy solution, first disk-based WDS solution, first MS-SQL acceleration, first Oracle optimization, first with specific Exchange 2003 and 2007 optimizations, first with dynamic workload sensing, and first with end-to-end SSL acceleration.

- Riverbed has grown rapidly in the last 3 years, with a proven set of technologies, a successful public offering in 2006, total revenue of $230M in 2007, and over 3500 customers worldwide.
- Riverbed is not resting on its laurels; with RiOS 5.0 Riverbed is not only the first vendor to support multi-vendor consolidation capabilities with its RSP, but it continues to push the state of the market forward with feature introductions like new protocol optimizations, hierarchical QoS and multiple WAN visibility modes.

Riverbed's introduction of support for multiple WAN visibility modes in RiOS 5.0 highlights its focus on customer requirements. WDS vendors argue back and forth about the merits of transparency vs non-transparency, but Riverbed's release of support for both modes, along with specific recommendations about how each mode can be best used, effectively renders any controversy in this area moot. This approach gives customers the flexibility to deploy in the mode that best meets their requirements, given their existing network configurations.

For existing customers, deploying RiOS 5.0, particularly if you have Exchange 2007 already installed, is something you should consider in a 3 to 6 month time frame. A non-disruptive upgrade path helps to make scheduling this easier. For new customers looking at WDS products, Riverbed is now and has been the pure-play functionality leader since the WDS market emerged in 2004, and they continue to pursue that leadership role with a single-minded focus. If you are considering WDS deployments, Riverbed should absolutely be on your short list.