

# PERFORMANCE BRIEF: File Transfer Protocol (FTP)

## TEST SUMMARY

- Up to 109 times performance increase for FTP transfers
- Up to 99% reduction in bandwidth utilization

## FTP over the WAN

FTP is the single most common TCP bulk data transfer application used by enterprises. However, performance of FTP is reduced dramatically across the WAN. As enterprises continue to centralize IT resources for greater control and to reduce costs, they continually struggle with performance challenges. They often unsuccessfully attempt to alleviate this problem by adding WAN bandwidth. However, adding more bandwidth does not directly address the problem. Mitigating the impact of network latency, and intelligently reducing the size of data transfers are both essential for accelerating FTP transfers over the WAN.

## Steelhead-Enhanced File Transfer Protocol (FTP)

Riverbed significantly optimizes FTP to deliver LAN-like performance for remote offices by utilizing the Riverbed Optimization System (RiOS) to simultaneously address bandwidth constraints and the combined effects of latency and protocol inefficiencies. RiOS utilizes fine grain data reduction as well as compression to perform Data Streamlining, reducing bandwidth utilization by 60 to 99%. Transport and Application Streamlining minimize protocol chattiness, eliminating 65 to 98% of packet roundtrips across the WAN.

## Performance Improvements

Riverbed Steelhead appliances dramatically reduced the time to transfer files via FTP, by 65 to 109 times in this test of common operations. Bandwidth utilization was reduced by up to 99%, dramatically freeing up WAN resources. Test results on a small file demonstrated a 65x performance increase over a 256k WAN with 20ms of latency. For a large file, performance was 109x faster over a T1 WAN with 100ms of latency.

### TESTING SCENARIOS

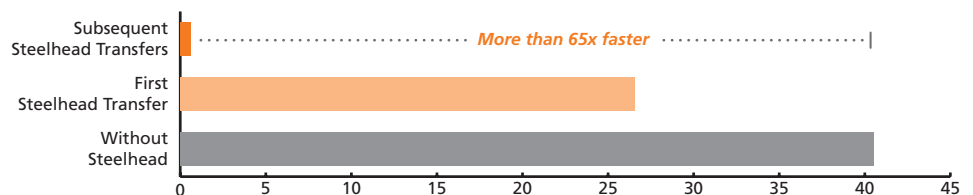
These tests were performed using file sizes ranging from 1.14 to 125 MB, Riverbed Steelhead appliances, IIS FTP Servers, and a network simulator running in-line. The WAN environment consisted of either 256K or T1 throughput, and 20 or 100 millisecond latency.

A latency of 100 milliseconds is typical of a remote office WAN connection between New York and Los Angeles, while latency of 20 milliseconds is typical of a regional link such as between Boston and New York.

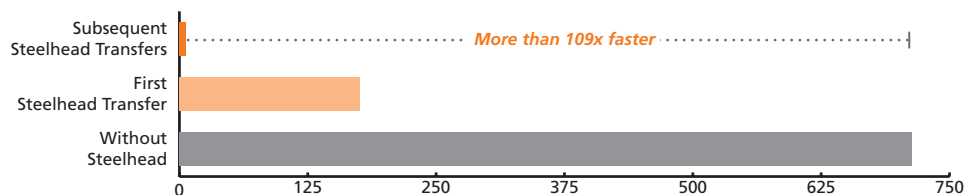
A "First Transfer" is defined as a data transfer that has never been seen by the Steelhead appliance before (completely new data).

A "Subsequent Transfer" is defined as a data transfer in which the Steelhead appliance has seen most or all of the data before (an incremental change or data that has been used by another application across the WAN).

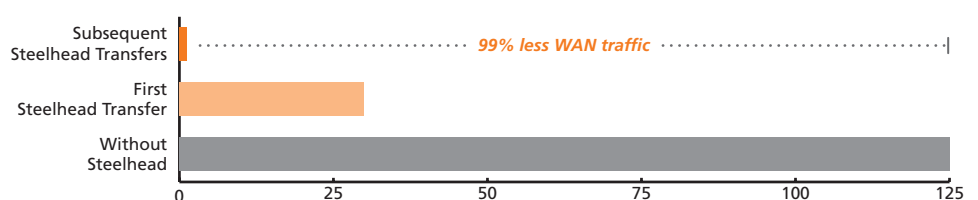
Small File (1.14 MB) over 256k WAN / 20ms latency – Time to Complete (in seconds)



Large File (125 MB) over T1 WAN / 100ms latency – Time to Complete (in seconds)



Large File (125 MB) over T1 WAN / 100ms latency – Bandwidth Utilization (in MB)



\*These results are based on the testing scenario presented in this paper. Your results may vary based on the conditions of your own network and the specifics of your own use cases.

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## DEPLOYMENT BENEFITS

Deploying Riverbed with FTP file transfers provides multiple benefits, including:

- **Improved productivity.** Long FTP transfer times over the WAN can now be significantly reduced. By dramatically reducing the time needed to complete bulk file transfers, users can save hours each day.
- **Better, faster collaboration.** By reducing the time to transfer FTP bulk files by an order or magnitude or more, Steelhead appliances enable users in multiple offices to work collaboratively on shared data, as bulk file transfers can be performed more frequently.
- **Reduced bandwidth utilization.** Steelhead appliances significantly reduce bandwidth utilization for remote offices with networked FTP servers, thereby reducing IT costs.

## Riverbed Optimization System (RiOS) Features

RiOS software combines patent-pending data reduction, TCP optimization, application-level latency optimizations, and remote office file and management functionality. Together, these technologies provide a comprehensive solution for enterprise wide-area data services, scaling across a range of applications and network topologies to accelerate applications up to 100x. RiOS consists of four key components

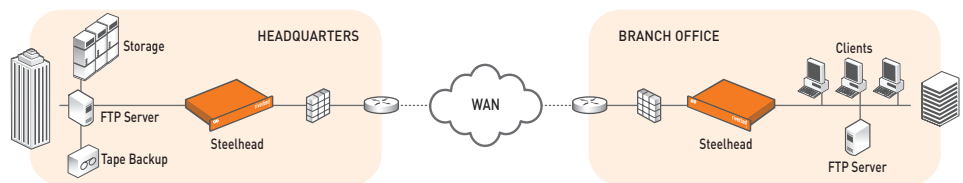
**Data Streamlining** – RiOS Data Streamlining works across all TCP applications to reduce bandwidth consumption by 60% to 95%. Data Streamlining works across Windows file sharing (including MS Office), Email (including MS Exchange and Lotus Notes), CAD, ERP, databases, and all other applications that use TCP, to ensure the same data is never sent more than once over the WAN. Data Streamlining also supports rules-based policy administration of optimization classes and packet marking for QoS and route control.

**Transport Streamlining** – RiOS Transport Streamlining reduces the number of TCP packets required to transfer data by 65% to 98%. Transport Streamlining overcomes TCP limitations by adapting transmission characteristics such as window scale, loss handling, congestion notification, and more. RiOS Transport Streamlining also enables greater utilization of high bandwidth, high latency connections with High-Speed TCP capabilities.

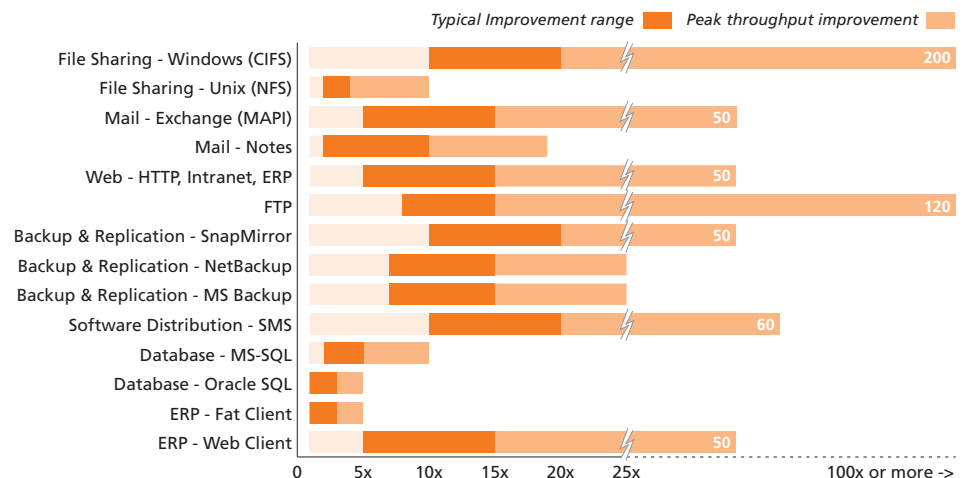
**Application Streamlining** – RiOS Application Streamlining provides additional order-of-magnitude application performance improvements by reducing application protocol chattiness up to 98% and minimizing application overhead. By minimizing application demands on the network such as application protocol round trips and required network connections, RiOS can provide massive throughput increases to applications including Windows file sharing (CIFS), Exchange (MAPI), Web (HTTP), and Database (MS-SQL). RiOS also includes important features for maximizing branch office productivity, such as file server capabilities and transparent pre-population of popular data.

**Management Streamlining** – RiOS simplifies the deployment and management of application acceleration infrastructure by employing a transparent approach to communications. RiOS enables easy deployment through auto-discovery of peers and auto-interception of traffic, with no reconfiguration of clients, servers, or routers necessary. RiOS simplifies ongoing management by providing simple but powerful Web-based and command line interfaces and reporting, as well as the integrated, centralized management and configuration. RiOS also enables a host of additional management features including dozens of deployment configurations, capabilities for redundancy, optional IPsec encryption, RADIUS/TACACS+ authentication, and SNMP traps.

## Typical Deployment Architecture



## Steelhead Appliances Accelerate a Broad Range of Applications



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