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EMC Documentum Documentum Webtop 5.3

Citrix WANScaler Performance Testing

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CITRIX® | Consulting

Revision History

Revision	Change Description	Updated By	Date
0.1	Initial Draft	Worldwide Field Services	8/21/2007
0.2	Worldwide Field Services QA	Worldwide Field Services	8/23/2007
0.3	Revisions	Worldwide Field Services	8/24/2007
1.0	Final Document	Worldwide Field Services	8/24/2007

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Executive Summary

Overview

Citrix Systems, Inc. (Nasdaq:CTXS) is the global leader and most trusted name in on-demand access. More than 180,000 organizations around the world rely on Citrix to provide the best possible access experience to any application for any user. Citrix customers include 100% of the Fortune 100 companies and 98% of the Fortune Global 500, as well as hundreds of thousands of small businesses and individuals. Citrix has approximately 6,200 channel and alliance partners in more than 100 countries. Citrix annual revenues in 2006 were $1.134 billion. Learn more at www.citrix.com.

The EMC Documentum product family helps companies manage all types of content across multiple departments within a single repository. With a unified repository, various groups can easily share and reuse their content with other areas of the business that would benefit from access to this valuable information. The product family also allows your business to share its content safely with outside organizations including partners, vendors, and customers.

As EMC Documentum and Citrix forge ahead in a partnership to better address a mutual customer base, one of the more striking synergistic elements is the ability to work together to address the challenges of expanding global industry. As businesses become more geographically dispersed over the world, the exchange of data is often hindered by low bandwidth high latency WAN connections. Businesses often attempt to overcome slow application response times by resorting to costly WAN link upgrades, only to find that the bandwidth cannot be fully utilized if networks span long distances and are thus subjected to high network latency. Additionally, users working from the same regional or branch office are often accessing the same documents and shared resources from the central data center in HQ, resulting in multiple, repetitive downloads of large amounts of data over a limited network connection.

Citrix WANScaler solutions provide high-performance application delivery to branch office users. WANScalers accelerate application performance across wide area networks (WAN) by an average of 5x to 30x, and up to 300x at peak compression efficiency. With WANScalers in the network, end users in the branch office will experience LAN-line application performance over the WAN which means less time waiting for slow applications and more time using the application.

Citrix WANScaler is a symmetric solution where an appliance is deployed both in the central data center as well as the branch office. Mobile and at-home users can benefit from WANScaler optimization by leveraging the Windows based WANScaler client software.

Citrix WANScaler provides benefits by using more suitable TCP parameters on the WAN side as well as an extensive compression history on disk and in memory, which allows for small tokens to traverse the WAN in place of the full length payload. In addition, layer 7 protocol optimization helps reduce the number of round trips on chatty protocols such as CIFS over the WAN.

This document outlines a recent performance testing project where Citrix WANScaler was used to accelerate traffic from Documentum Webtop 5.3 over varying WAN conditions.

Project Summary

Two primary tests were conducted with varying parameters, including a number of different WAN scenarios. The highlights of this testing for each test are listed in the table below.

Test	Results	Analysis
Automated Workflow Execution Mercury LoadRunner scripts were repeated over varying WAN conditions. Transaction times were extracted from virtual user output logs for workflow execution times.	Workflow execution times demonstrated improved performance up to **63%** with WANScaler enabled. The rate of improvement increased with diminishing WAN conditions as bandwidth decreased and latency increased.	Although Webtop 5.3 utilizes Documentum's proprietary Unified Client Facility (UCF) protocol, which provides compression and optimization, WANScaler was able to increase workflow execution times by using links more efficiently and significantly reducing bandwidth utilization with disk based compression.
Manual File Downloads (Exports) Files with varying sizes were exported from Webtop 5.3 over varying WAN conditions. Execution times were obtained by using a stopwatch to time file transfers.	File download times were increased up to **200X** with WANScaler enabled. As with workflow execution times, the rate of improvement for file exports also increased with diminishing WAN conditions as bandwidth decreased and latency increased.	File exports in Webtop 5.3 are managed by the UCF protocol. WANScaler was able to improve upon the optimizations present in the UCF protocol by more efficiently using network resources. Second pass data, recorded in the WANScaler compression history, demonstrated provided the best results.

The charts below show file download performance gains obtained by TCP optimization and compression with WANScaler. Each network scenario contains a baseline pass where WANScaler was bypassed, a first pass through WANScaler, and a second pass through WANScaler where the benefits of compression provide the greatest increases.

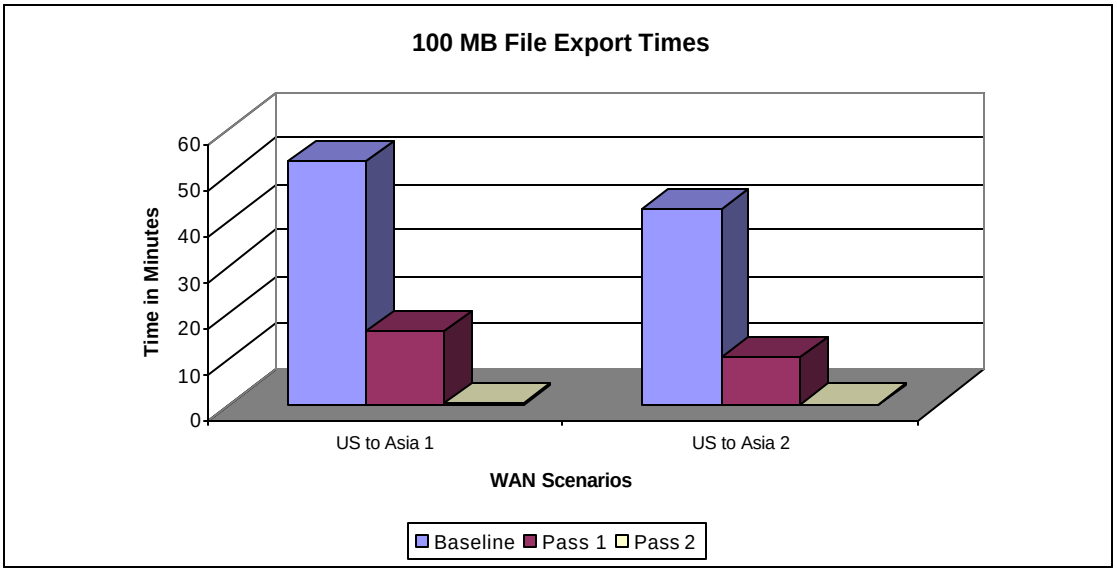

Figure 1 – 100 MB File Export Times

A 100 MB file download time improved from nearly one hour to less than one minute.

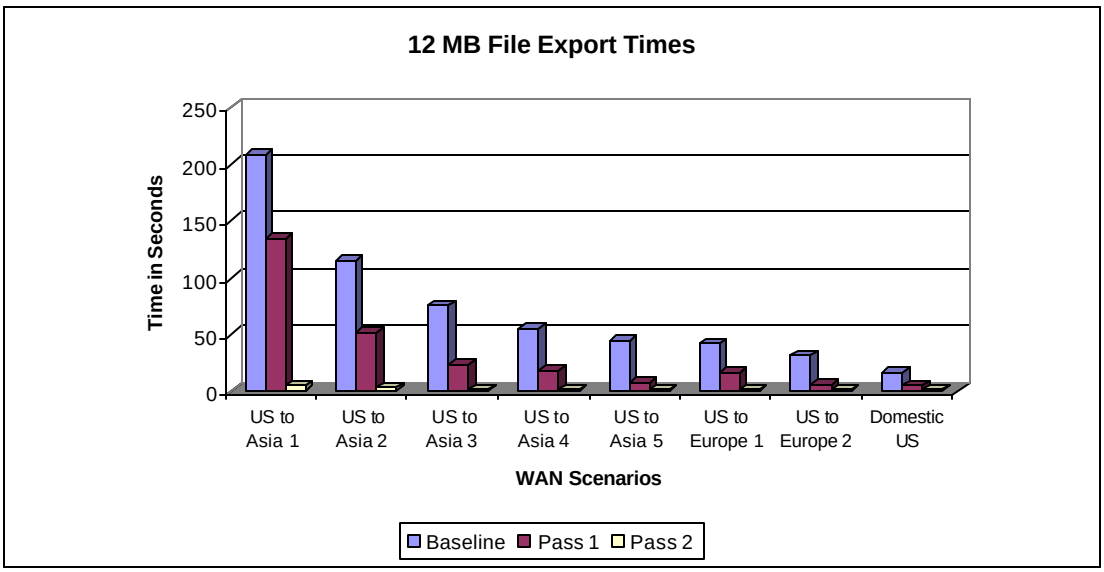

Figure 2 – 12 MB File Export Times

A 12 MB file export time improved from over 3 minutes to less than 1 second. Additional analysis is available in the Performance Analysis and Results section.

Testing Methodology

Test Methods

Manual Testing – File downloads

File download testing for WANScaler was performed manually with a stopwatch. At least three iterations for each test were performed, and the average download times were recorded.

Virtual User Simulation – Workflow performance

EMC Documentum supplied Web protocol scripts for Mercury LoadRunner based on a standardized set of user workflows. Performance data for workflow actions were measured by using defined transactions in the LoadRunner scripts and extracting the transaction execution times from the LoadRunner output logs. To mitigate excessive deviations between tests, three iterations were run for each workflow during each test run. The average values were applied.

WAN Emulation

WAN emulation was provided by an Apposite Linktropy 4500 appliance. This appliance allows the replication of WAN behavior by adjusting factors such as available bandwidth, latency, and packet loss.

Test Environment and Test Execution

Architecture

The test environment architecture is a standard representation of branch office users connecting to a primary data center over a WAN connection. The end user, represented in the diagram below, was either a live test user, performing file export tests, or a virtual user, running automated workflow tests via LoadRunner.

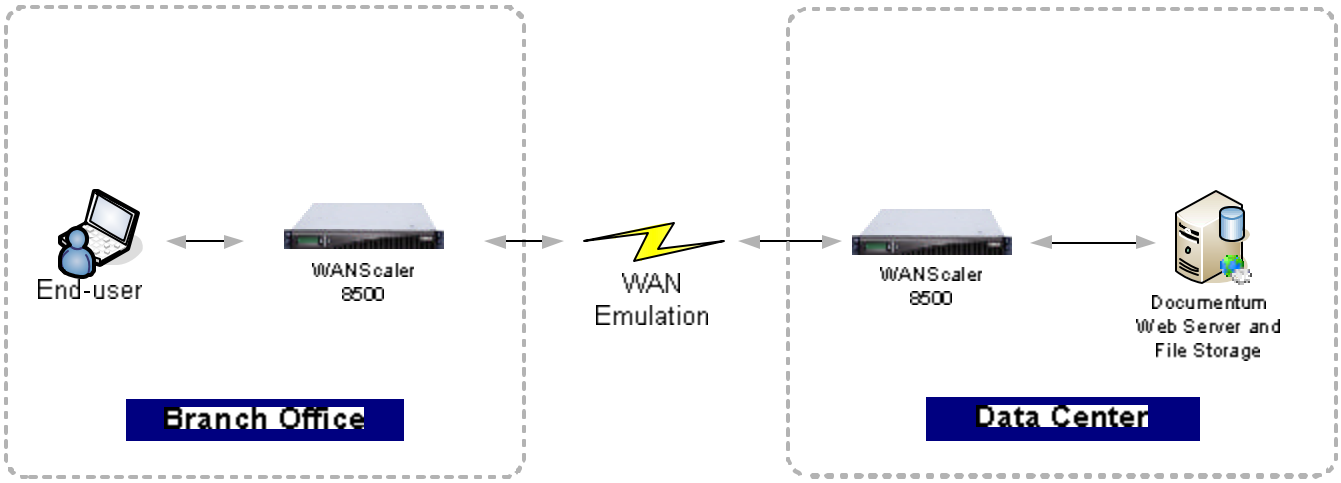

Figure 2 – Test Environment Architecture

The Documentum Webtop components were supplied by EMC Documentum as a single virtual machine image. The only changes made to the virtual machine image were IP addresses and memory allocation.

Hardware and Software Platform

The test environment consists of the following components:

Component	Hardware Platform	Installed Software and Versions
Citrix WANScaler	WANScaler 8500 series	WANScaler build 4.1.2
WAN Emulator	Apposite Linktropy 4500	Version 2.03
LoadRunner Controller	HP DL360 G2 Dual Intel CPUs 1.4 GHz 2 GB RAM	Windows 2003, Enterprise, SP1 Mercury LoadRunner 8.1
Documentum Server Host Machine	HP DL360 G4 Dual Intel CPUs 3.6 GHz 4 GB RAM	Windows 2003, Enterprise, SP1 VMWare Workstation 5.5
Documentum Webtop 5.3 **Web Server and File Storage**	Virtual Machine 2 GB RAM 1 Virtual Processor	Windows 2003, Standard, SP1 Apache Tomcat 5.0 SQL Server 2000 Documentum Administrator 5.3 Documentum Content Server 5.3 Documentum DFC Runtime Environment 5.3 Documentum Web Services 5.3 Documentum Webtop 5.3

WAN and Network Conditions

Workflow Network Scenarios

A variety of WAN connections were tested to evaluate gains in workflow execution times similar to those a user would encounter in different regional or branch office scenarios across the globe. The different scenarios tested are listed below.

Network Scenario	Conditions
Branch Office to HQ between US and Asia 1	256 Kbps, 300ms Latency, 1% Packet Loss
Branch Office to HQ between US and Asia 2	768 Kbps, 300ms Latency, 1% Packet Loss
Branch Office to HQ between US and Europe	1.5 Mbps, 200ms Latency, 0.1% Packet Loss
Branch Office to HQ within US	6 Mbps, 90ms Latency, 0.1% Packet Loss

Workflows

Four separate workflows were chosen to exercise some of Documentum Webtop's core functionalities. Each workflow was repeated over three iterations, and the average execution time values were used for this analysis. The workflows chosen are listed below.

- Import a file into a home cabinet
- Check out a file
- Check in a file
- Perform a Quick Search and export a file

File Download Network Scenarios

As with the workflow testing, a variety of WAN connections were tested to evaluate gains in file export times similar to those a user would encounter in different regional or branch office scenarios across the globe. The different scenarios are listed below.

Network Scenario	Conditions	File Descriptions
US to Asia 1	128 Kbps, 300ms Latency, 1% Packet Loss	1 MB, 6 MB, and 12 MB .doc files
US to Asia 2	256 Kbps, 300ms Latency, 1% Packet Loss	1 MB, 6 MB, and 12 MB .doc files
US to Asia 3	768 Kbps, 300ms Latency, 1% Packet Loss	1 MB, 6 MB, and 12 MB .doc files 100 MB .mpg file
US to Asia 4	1.5 Mbps, 300ms Latency, 1% Packet Loss	1 MB, 6 MB, and 12 MB .doc files
US to Asia 5	6 Mbps, 300ms Latency, 1% Packet Loss	1 MB, 6 MB, and 12 MB .doc files
US to Europe 1	1.5 Mbps, 200ms Latency, 1% Packet Loss	1 MB, 6 MB, and 12 MB .doc files 100 MB .mpg file
US to Europe 2	6 Mbps, 200ms Latency, 0.1% Packet Loss	1 MB, 6 MB, and 12 MB .doc files
Domestic US	6 Mbps, 90ms Latency, 0.1% Packet Loss	1 MB, 6 MB, and 12 MB .doc files

Citrix WANScaler Configuration

Two non-default WANScaler Service Classes were employed in this test to accelerate Documentum traffic between endpoints in this test: The custom Documentum Service Class and the default Unclassified TCP Service Class. The flow control and compression settings for the corresponding Service Class Policies are below:

Service Class Policy	Flow Control	Compression
Documentum	Checked	Disk
Unclassified TCP	Checked	Disk

The Documentum Service Class rules are demonstrated in the figure below.

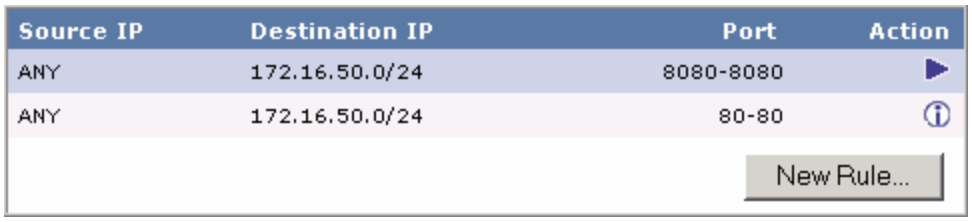

Figure 3 – Documentum Service Policy

The Softboost bandwidth mode was selected with the Full Bandwidth option. Bandwidth management settings were adjusted 96% of the available bandwidth for each WAN scenario, which is considered a best practice for performance tuning.

Performance Analysis and Results

Workflow Execution Times

The following tables detail the performance improvements obtained during this test.

Workflow	Test	Response Time	Improvement	Response Time	Improvement
WAN Parameters		**6 Mbps / 90 ms latency**		**1.5 Mbps / 200 ms latency**	
Import a File	Baseline	72.35		123.54	
	WANScaler	54.94	24.06%	86.48	30%
File check out	Baseline	58.33		100.98	
	WANScaler	47.24	19.01%	70.09	30.59%
File check in	Baseline	60.41		104.91	
	WANScaler	51.93	14.03%	77.34	26.28%
Search + File Export	Baseline	56.58		95.73	
	WANScaler	43.87	22.46%	63.52	33.65%

Workflow	Test	Response Time	Improvement	Response Time	Improvement
WAN Parameters		**768 Kbps / 300 ms latency**		**268 Kbps / 300 ms latency**	
Import a File	Baseline	188.96		292.23	
	WANScaler	113.34	40.02%	115.86	60.35%
File check out	Baseline	141.29		222.69	
	WANScaler	87.21	38.28%	88.57	60.23%
File check in	Baseline	164.30		247.08	
	WANScaler	110.01	33.04%	112.61	54.42%
Search + File Export	Baseline	142.53		236.42	
	WANScaler	83.53	41.40%	87.87	62.83%

The following charts depict the results for various WAN parameters.

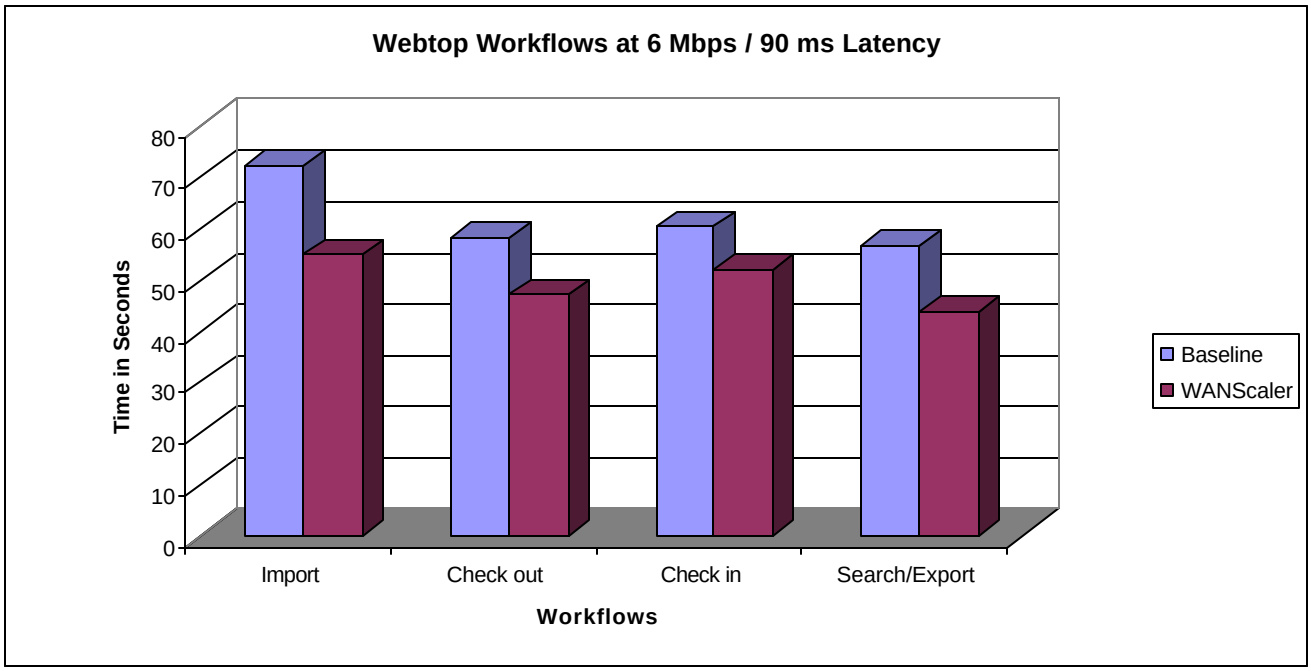

Figure 4 - 128 Kbps and 300 ms Latency

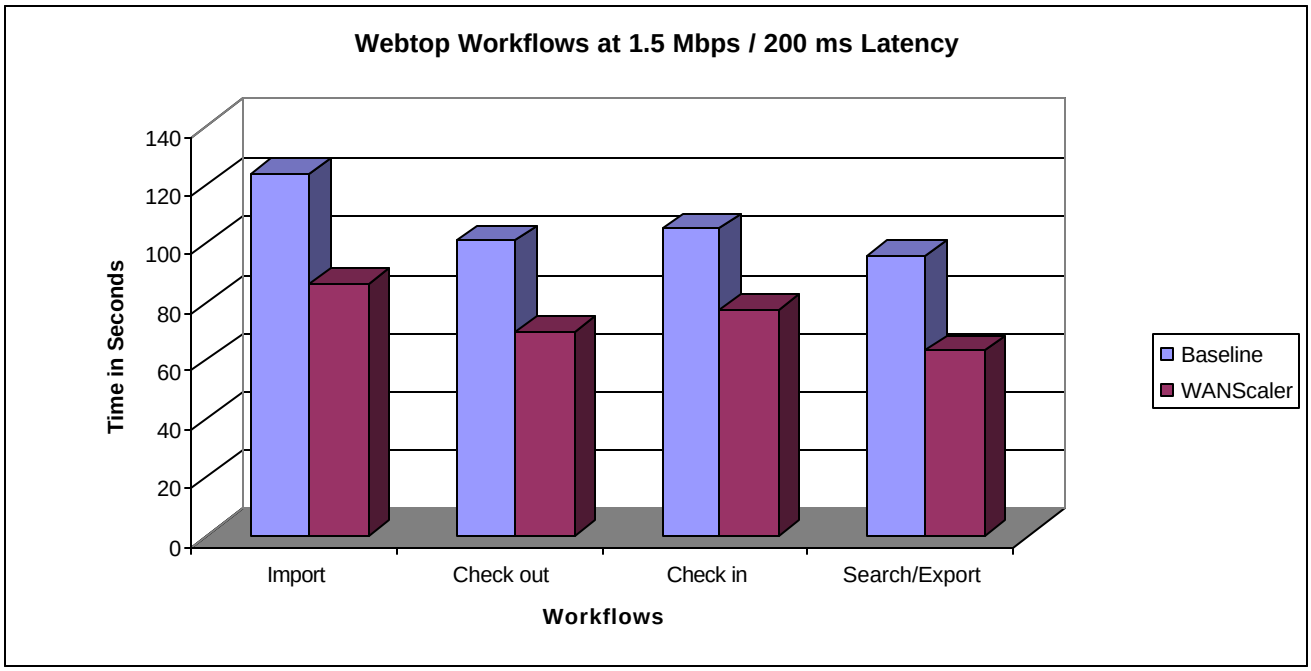

Figure 5 - 128 Kbps and 300 ms Latency

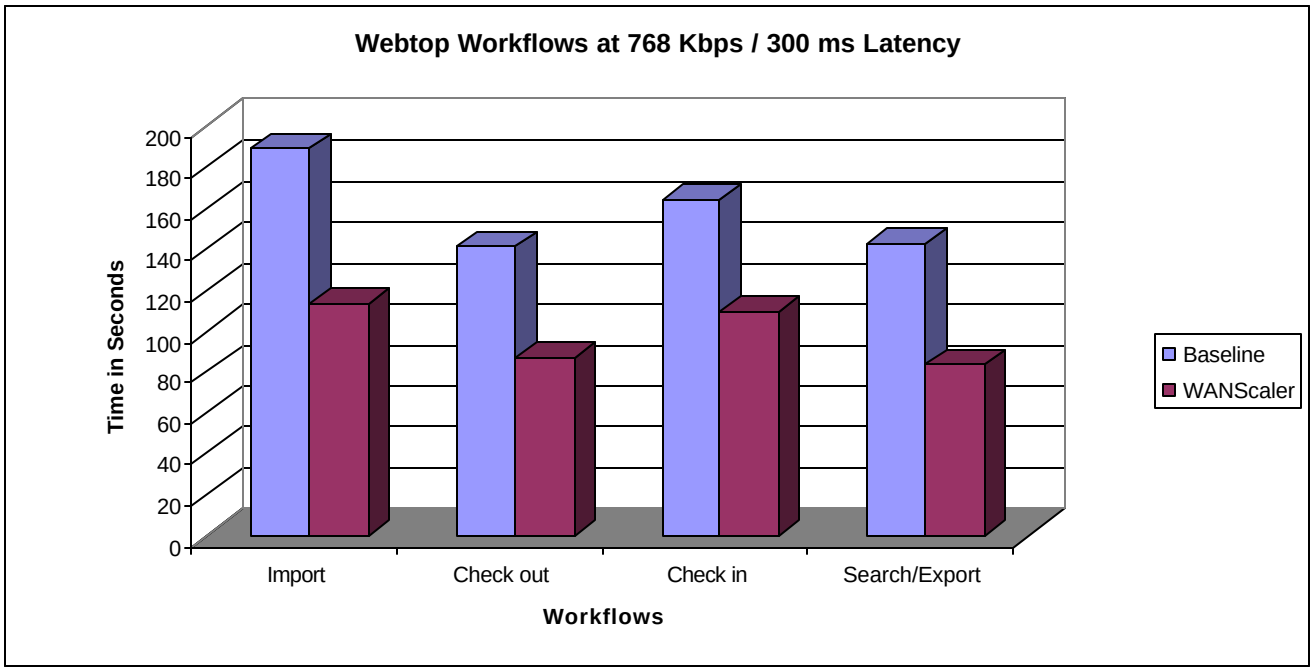

Figure 6 - 128 Kbps and 300 ms Latency

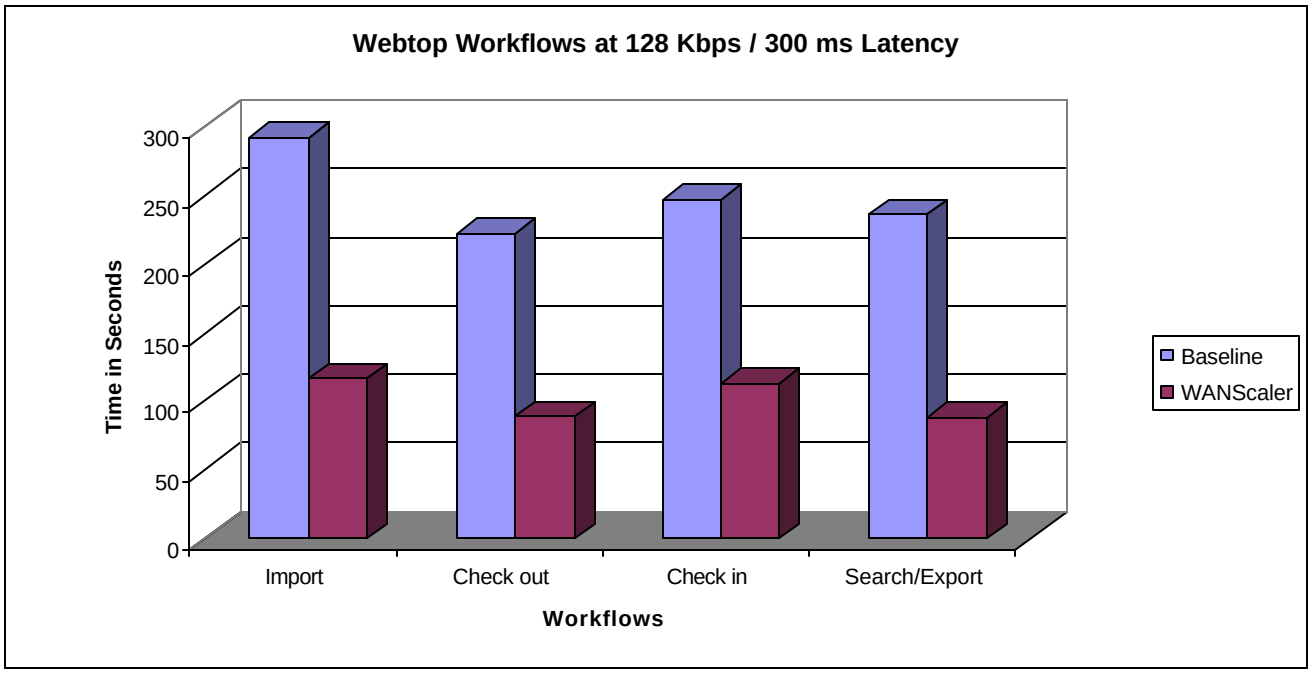

Figure 7 - 128 Kbps and 300 ms Latency

These results demonstrate the potential for WANScaler to provide significant improvements to workflow execution times in a variety of WAN scenarios, adding value to the already optimized UCF protocol used for file transfers in the Webtop environment. WANScaler demonstrates improvements in every scenario with increasing gains as WAN scenarios depreciate, showing gains of up to 24% over a 6 Mbps connection and gains of over 60% over a 128 Kbps connection.

File Export Times

Common File Sizes

The charts below demonstrate file export performance gains obtained with WANScaler, highlight the Compression feature. Three Microsoft Word documents were used in this test, ranging from 1 MB to 12 MB.

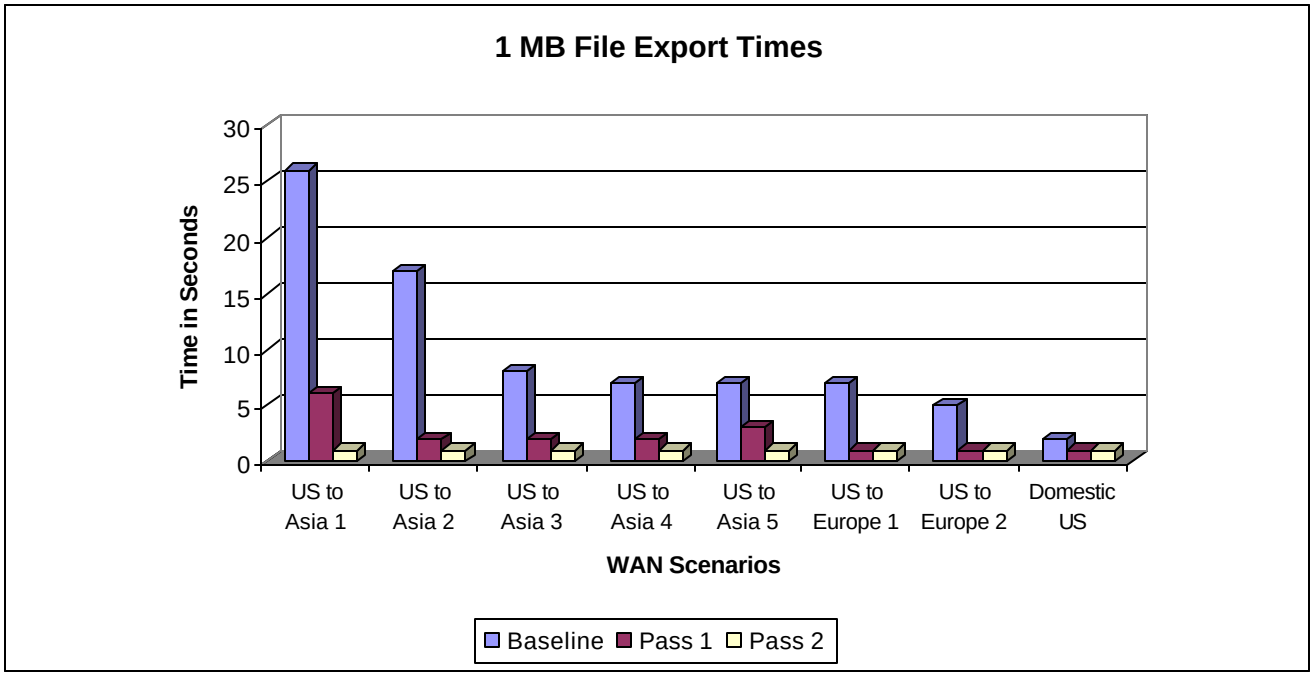

Figure 8 - 1 MB File Export Times

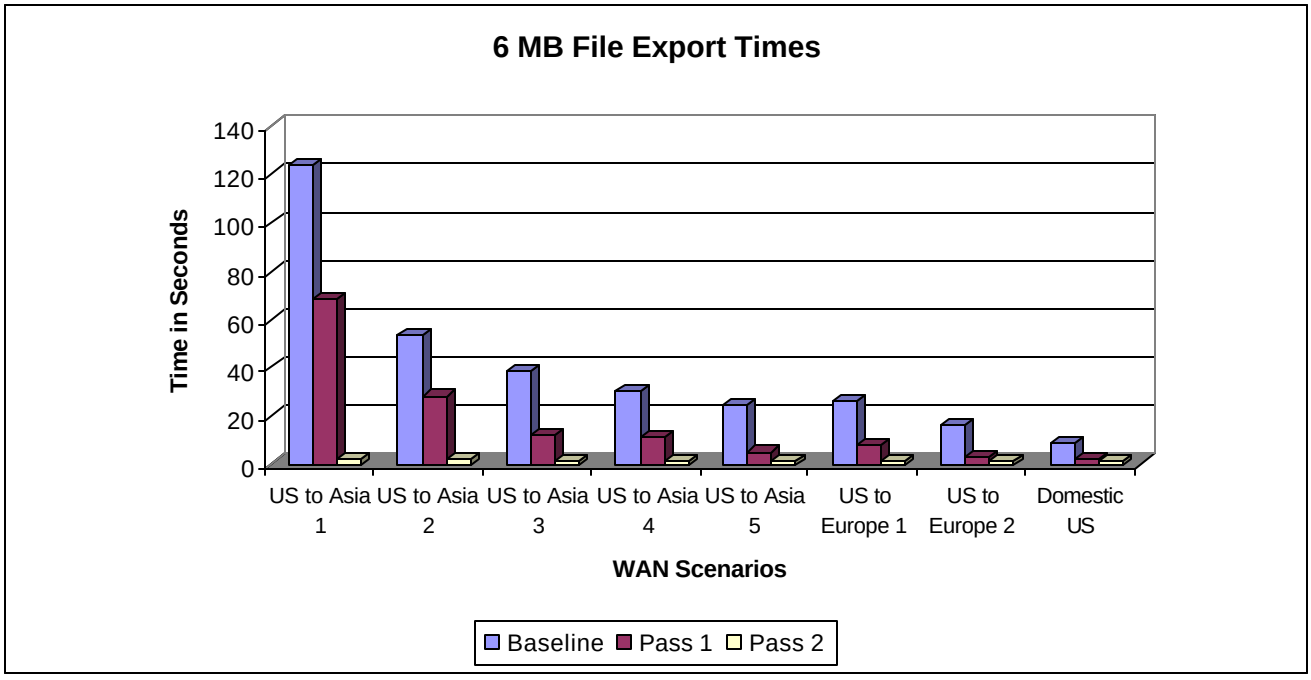

Figure 9 - 6 MB File Export Times

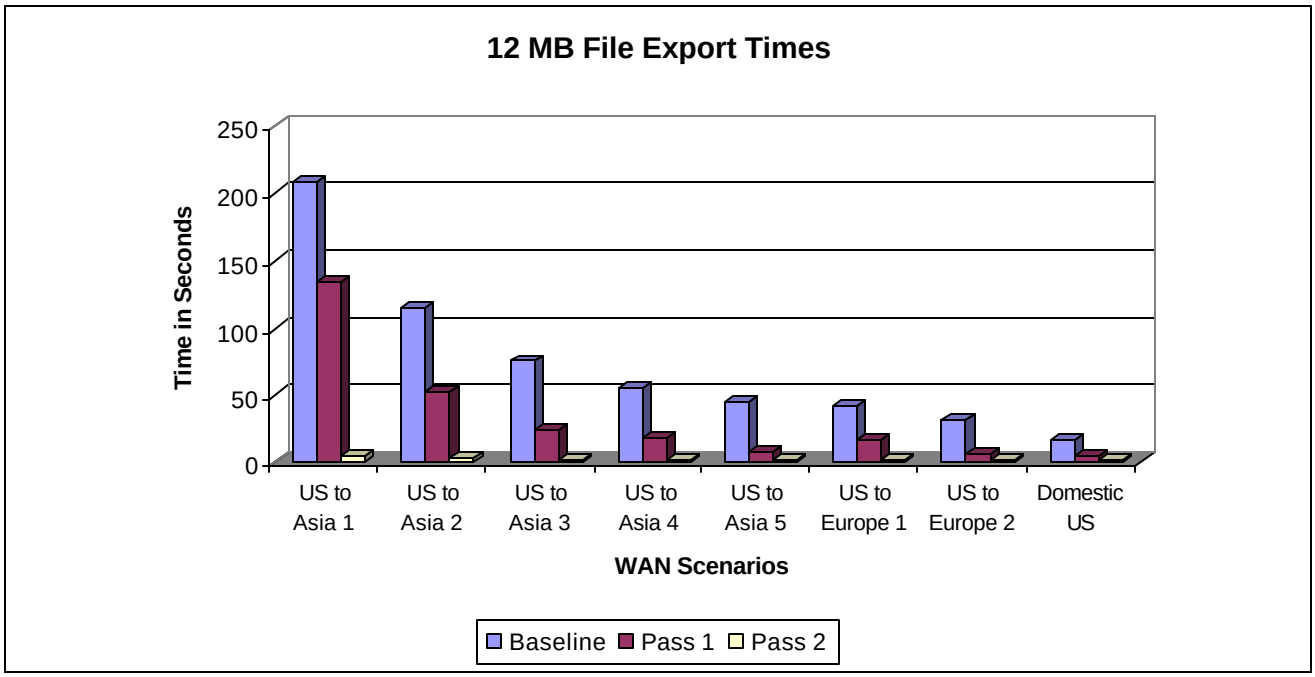

Figure 10 - 12 MB File Export Times

As the figures above show, file export times are significantly improved by WANScaler. For a more typical WAN scenario between the US and Asia, with 1.5 Mbps and 300 ms of latency, file export times improved from 75 seconds to 1 second, which corresponds to 75X acceleration. With 128 Kbps, the export time for a 12 MB file improves from over 3 minutes to less than 1 second, correlating to a gain of over 200X.

Large File Export

The chart below depicts the acceleration obtained from WANScaler for large exports across low bandwidth high latency WAN connections.

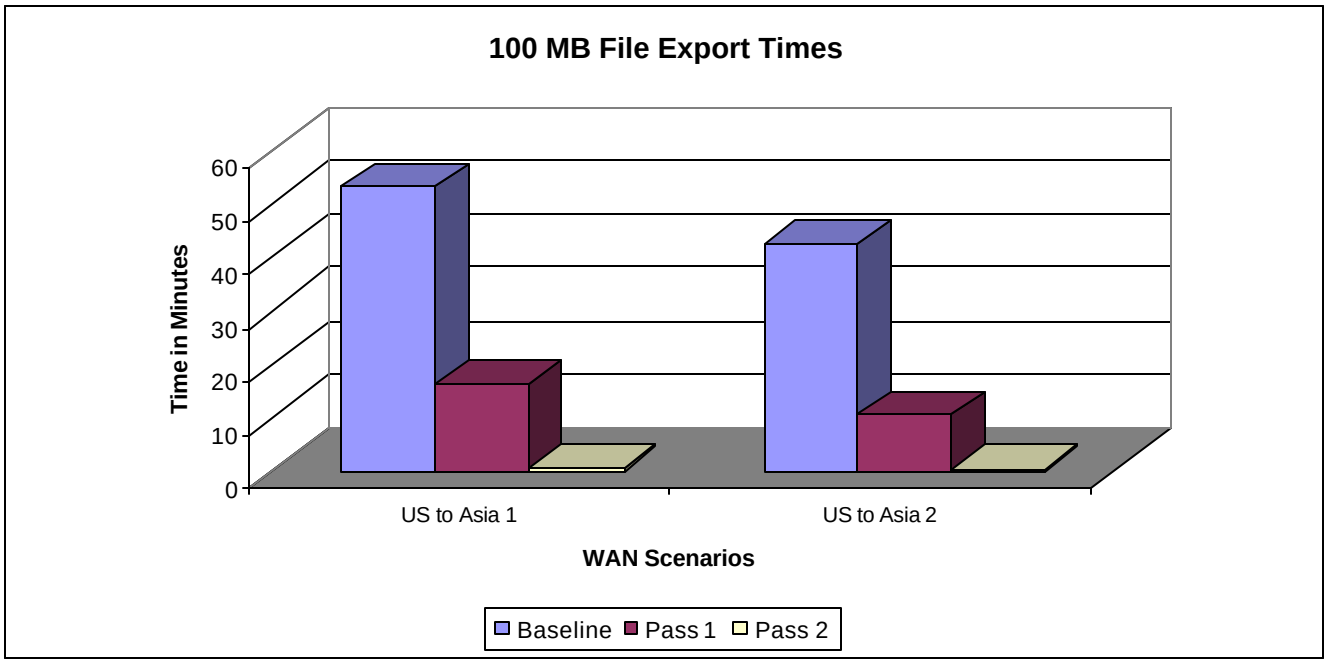

Figure 11 - Large File Export Times

The results shown in Figure 11 demonstrate improvements of 100X for both of the WAN scenarios tested with a 100 MB file during a second pass attempt through the WANScaler. Download times were reduced from nearly one hour to under one minute.

Appendix A - File Download Times

Common File Sizes

The table below contains file export times which were manually obtained using a stopwatch. All values were rounded to the nearest whole number value with the exception of times less than 1 second. All values less than one second were rounded up to one second.

	Baseline			Pass 1			Pass 2		
WAN Scenario	**12 MB**	**6 MB**	**1 MB**	**12 MB**	**6 MB**	**1 MB**	**12 MB**	**6 MB**	**1 MB**
128Kbps, 300ms Latency, 1% Packet Loss	208	124	26	135	69	6	4	2	1
256Kbps, 300ms Latency, 1% Packet Loss	116	54	17	52	28	2	3	2	1
768Kbps, 300ms Latency, 1% Packet Loss	75	38	8	24	12	2	2	1	1
1.5Mbps, 300ms Latency, 1% Packet Loss	55	30	7	18	11	2	2	1	1
1.5Mbps, 200ms Latency, 1% Packet Loss	42	26	7	16	8	1	2	1	1
6Mbps, 300ms Latency, 0.1% Packet Loss	44	24	7	7	5	3	2	1	1
6Mbps, 200ms Latency, 0.1% Packet Loss	31	16	5	6	3	1	2	1	1
6Mbps, 90ms Latency, 0.1% Packet Loss	16	9	2	4	2	1	1	1	1

Large File Sizes

The table below contains file export times for a 100 MB file, which were manually obtained using a stopwatch. Times below are in minutes and rounded to the nearest tenth.

	Baseline	Pass 1	Pass 2
768 Kbps 300 ms	52.9	16.2	0.5
1.5 Mbps 200 ms	42.4	10.3	0.4

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