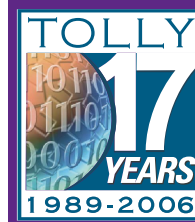


Packeteer, Inc.

iShared Server and iShared Remote Appliances

Performance and Functionality Evaluation



Test Summary

Premise: Branch-office workers need real-time access to corporate files, services and applications, all while enjoying optimal performance without compromising security. Users need a comprehensive, multi-layered solution that dramatically reduces WAN latency while also creating a coherent, global, file-sharing environment.

Packeteer, Inc. commissioned The Tolly Group to evaluate the performance and verify key functionality for the company's iShared Remote and iShared Server appliances running its full suite of iShared IT Services. Packeteer's iShared product line consists of network appliances designed to deliver wide area file services (WAFS) and other branch-office IT services on a single consolidated platform.

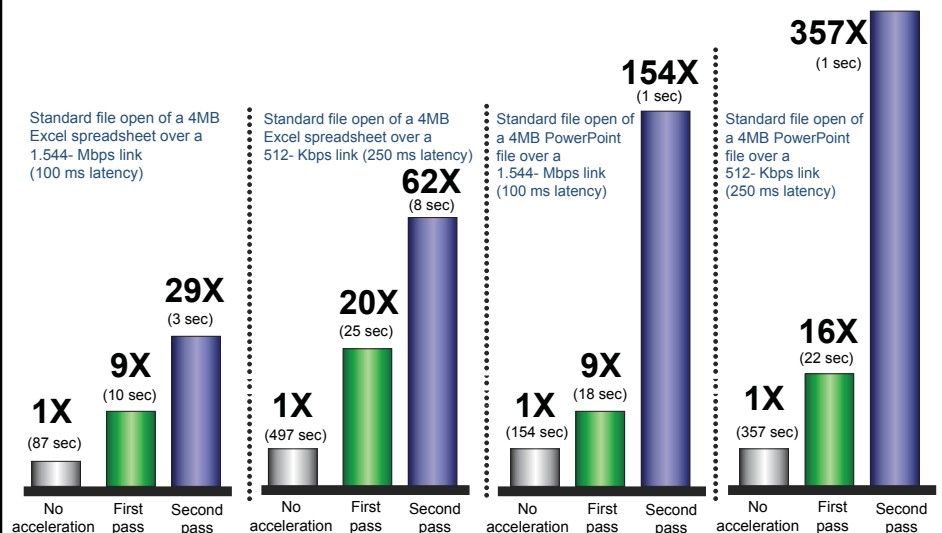
The iShared Remote appliance is placed at a corporate branch office and allows remote users to access centrally located file and E-mail servers as if they were in the same physical location. The iShared Server appliance is located at the corporate data center, and brokers communications between a network of iShared Remotes. The iShared Remote appliance also delivers a suite of centrally-managed, branch office IT services that includes: E-mail (Exchange), print, Web caching, networking and management services.

Tolly Group engineers conducted extensive performance tests designed to measure the effectiveness of the Packeteer appliances — in terms of the response-time improvements

Test Highlights

- Accelerates CIFS traffic dramatically, delivering up to 357X improvement in response times over the WAN
- Accelerates MAPI traffic by optimizing transfer of E-mail over the WAN, delivering a hefty 52X improvement in response times, and up to a 99.6% reduction in bandwidth consumption
- Delivers end-to-end support for SMB packet signing, allowing operators to maintain both maximum file access performance and security in their networks
- Delivers IT Services like print, DNS, DHCP and Web caching, resulting in significant savings on capital expenditures for remote offices
- Allows transparent provisioning of WAFS services during WAN disruption, ensuring data integrity and protecting user data

Application Acceleration Response Time Improvement Benefit of iShared Remote When Opening Excel and PowerPoint Files Over 512-Kbps and T-1 Links



Source: The Tolly Group, September 2005

Figure 1

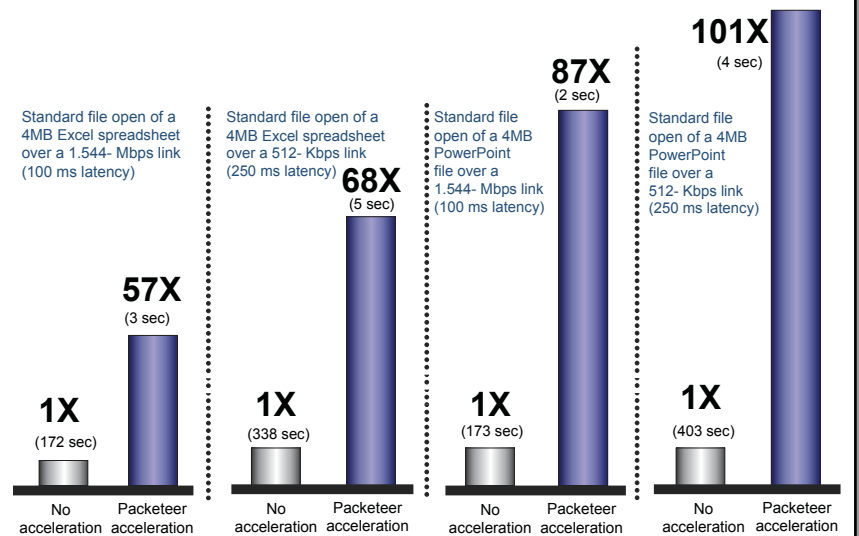
delivered to users and the yield in bandwidth reduction from compression and caching of file and E-mail traffic. Tolly Group engineers also verified the presence of several key features and services, including, Server Message Block (SMB) packet signature compatibility, WAFS security and resiliency in the face of WAN circuit disruptions, and the presence of print, DNS, DHCP and Web caching services. Tests were conducted by Tolly Group engineers in September 2005 at Packeteer facilities in South Plainfield, NJ.

RESULTS

RESPONSE-TIME IMPROVEMENT FOR WAFS

Tolly Group engineers measured the response times of a remote client requesting common Microsoft Excel and PowerPoint files across simulated 1.544-Mbps (T1) and 512-Kbps links.

Application Acceleration Response Time Improvement Benefit of iShared Remote When Saving Modified Excel and PowerPoint Files Over 512-Kbps and T-1 Links



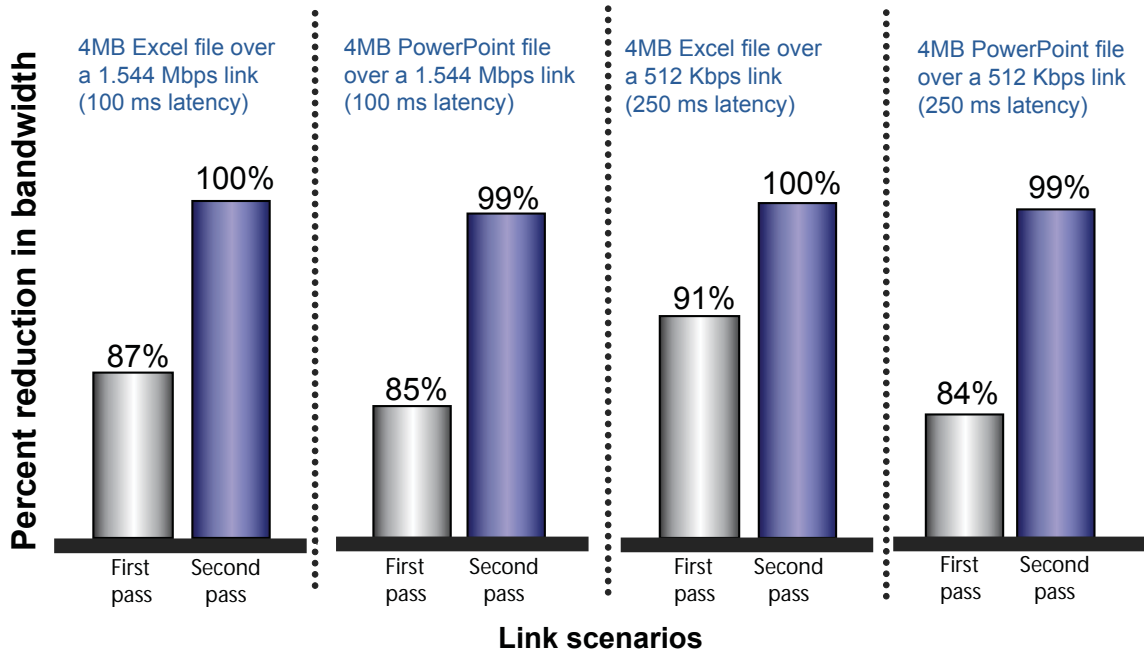
Source: The Tolly Group, September 2005

Figure 2

Results show that 87 seconds were consumed when opening a 4MB Excel file over a simulated T1 connection (with 100ms of latency). Opening that same file over a 512-Kbps link consumed 497 seconds. When engineers added the iShared Remote/ iShared

Server to the equation, that same 4MB Excel file required just nine seconds to open across the simulated T1, and 25 seconds across the simulated 512-Kbps link, representing a response time improvement of 9X and 20X, respectively. This first access is

Impact of iShared on WAFS Bandwidth Consumption



Source: The Tolly Group, September 2005

Figure 3

known as a "cold" access, and Packeteer's WAN optimization technologies, including compression and latency reductions, work to provide a dramatic performance benefit even on initial requests. Then, on a second pass of the file across the iShared solution (a "warm" access), the time required to open the 4MB Excel file shrank even further — to three seconds over the simulated T1 link and eight seconds over the simulated 512-Kbps link, both representing response time improvements of 29X and 62X over the file open procedure without the aid of any acceleration.

Tolly Group engineers ran the same test, this time transferring a 4MB PowerPoint file. Without the aid of the iShared acceleration appliance, the file transferred in 154 seconds over a simulated T1 link and 357 seconds over the simulated 512-Kbps link. When the iShared Remote/ iShared Server were added to the test bed, the file access took 18 seconds across the T1 and 22 seconds across the 512-Kbps link. There were even more dramatic results when the file was accessed a second time. When the user requested the file a second time, the PowerPoint took just one second over the T1 and over the 512-Kbps simulated links, representing a response-time improvement of 154X and 357X over the file open procedure without the aid of any acceleration. (See Figure 1.) This demonstrates the benefit of the WAFS appliance both on initial file access, and when handling files that are requested on a regular basis.

Next, engineers measured the response times of a remote client saving both Excel and PowerPoint files over simulated WAN connections. When engineers saved

a 4MB Excel file over the 1.544-Mbps link, the file-save operation took 172 seconds with no acceleration applied. Over the same connection, using the same file, the file-save operation took just three seconds when the iShared Remote/ iShared Server appliance was added to the configuration. That represents a 57X response-time improvement.

The same test was run again, over the 512-Kbps link, with similar results. This time, the iShared Remote/ iShared Server appliance resulted in a response-time improvement of 68X (five seconds versus 338 seconds).

The same file-save operation was applied for the PowerPoint scenario, as well. Here, again, results show that with no acceleration applied, the file-save operation took 173 seconds over the T1 link, but just two seconds when the iShared Remote/ iShared Server appliance was deployed. That represents an 87X improvement in the file-save response time. The improvement jumps to 101X when tested over a 512-Kbps link with 250ms of latency. (See Figure 2.)

BANDWIDTH SAVINGS FOR WAFS

Tests show that the Packeteer iShared Remote/ iShared Server appliances yield sizable improvement in response time for WAFS operations. But there is a second benefit that comes in the form of bandwidth savings.

Tolly Group engineers examined the amount of bandwidth utilized during a first-pass of files through the iShared Remote appliance. Results show that iShared Remote yielded a reduction of WAN

Packeteer, Inc.

iShared Server and iShared Remote

Functionality and Performance



Packeteer, Inc. iShared Appliance Product Specifications*

Core Features

- CIFS and NFS file acceleration via WAFS
- Microsoft Exchange (MAPI) WAN acceleration
- Web (HTTP) caching and optimization
- Print, DNS, DHCP, and Domain Controller services
- Software management and distribution optimization

Management features

- Web-based administration
- Centralized software upgrades
- SNMP support
- System-at-a-glance diagnostic console
- Bandwidth efficiency charting

Product Options

- 100GB, 300GB and 700GB RAID-backed persistent cache sizes
- Windows- and Linux-based operating system platforms
- Choice of Packeteer hardware appliance, qualified IBM, HP, or Dell servers, or software-based deployment

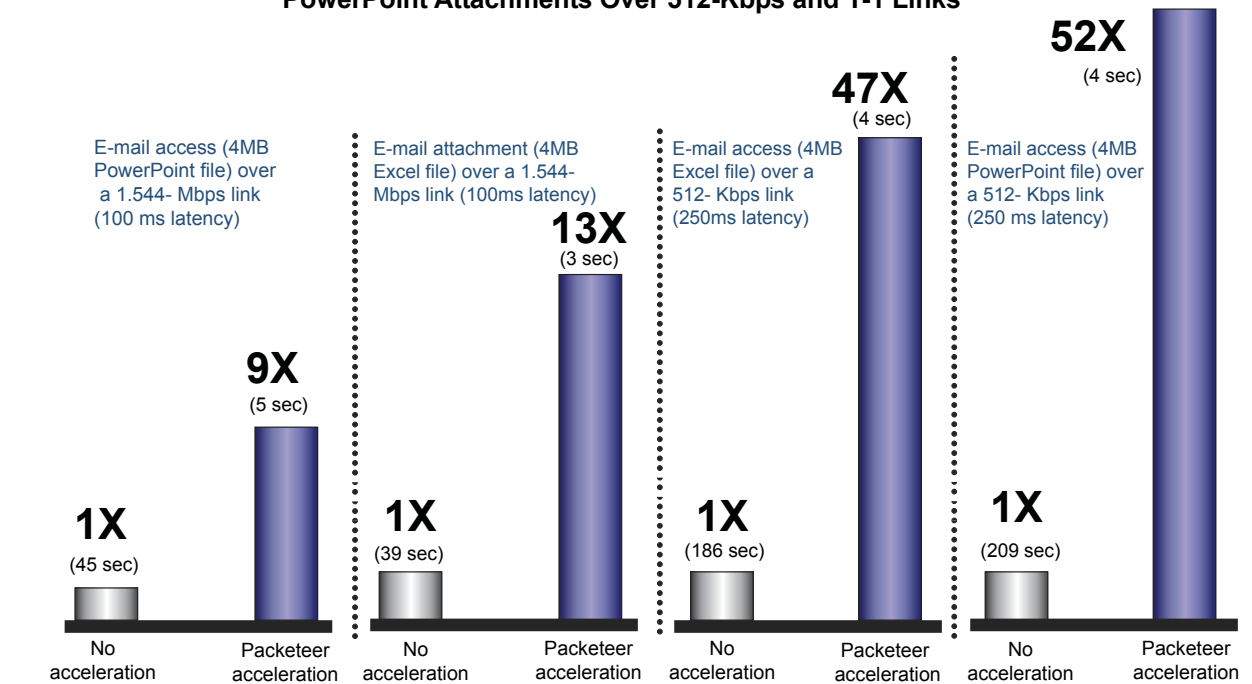
For more information contact:

Packeteer, Inc.
10201 N. De Anza Boulevard
Cupertino, CA 95014
United States
Phone: (408) 873-4400
or (800) 697-2253
Fax: (408) 873-4410
URL: www.packeteer.com

**Vendor-supplied information not verified by The Tolly Group*

This test summary is a rebrand of document #205133. Packeteer, Inc. acquired Tacit Networks in May 2006.

MS Exchange Acceleration Response Time Improvement Benefit of iShared Exchange Services When Accessing E-mail with Excel and PowerPoint Attachments Over 512-Kbps and T-1 Links



Source: The Tolly Group, September 2005

Figure 4

bandwidth consumption of between 84% and 91% on a first pass — meaning the Packeteer solution used up to 91% less bandwidth than WAN access without the Packeteer solution. (See Figure 3.) A second request for the same file shows that there is a 99% to 100% reduction in bandwidth consumption — meaning the data has been cached locally on the iShared Remote and is not taxing costly WAN circuits. In fact, the only time that the iShared Remote reaches back to the iShared Server is when it needs new data that is not locally available.

RESPONSE-TIME IMPROVEMENT FOR MS EXCHANGE ATTACHMENTS

Response-time acceleration is not limited to accessing and saving files over the wide area. With large attachments consuming the vast majority of storage and network resources in MS Exchange environments, companies also need

to improve the response times of accessing E-mail over the WAN. Packeteer enables that via its iShared Exchange Services. Packeteer iShared Exchange Services ensures that E-mail attachments are delivered only once per branch office and that only file differences are transmitted via the WAN when attachments are revised and saved.

Engineers accessed an E-mail with a 4MB PowerPoint attachment from a remote client to a central Exchange server across the simulated WAN. Without the benefit of acceleration, the operation took 45 seconds. With the iShared Exchange Services active, the same operation took just five seconds — that's a nine-fold improvement in response time over the no acceleration scenario.

When engineers re-ran the test, this time over a 512-Kbps link with 250ms of latency, the operation consumed 209 seconds when no

acceleration was used, versus just four seconds with iShared Exchange Services in the configuration. That represents a 52X improvement in response time. (See Figure 4.)

Engineers ran the test again, this time substituting a 4MB Excel file. Over the T1 link, the file-save operation took 39 seconds without acceleration versus three seconds with iShared Exchange Services — a 13X response-time improvement. When engineers ran the test over the 512-Kbps link, the iShared Exchange Services delivered a response time improvement of 47X.

BANDWIDTH SAVINGS FOR EXCHANGE

The Packeteer solution reduced bandwidth consumption by as much as 99.6% when opening and saving a 4MB Excel file E-mail attachment across a 512-Kbps link. In a base-line scenario where no acceleration tool was employed, the

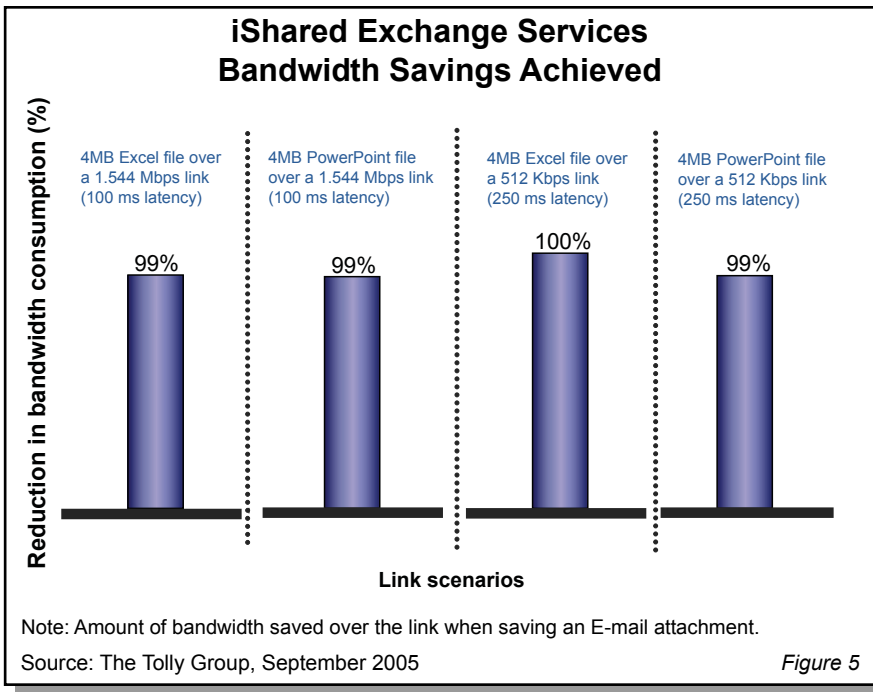


Figure 5

server sent 7,104,147 bytes, as opposed to only 26,752 bytes when the iShared Server/Remote solution handled the operation. (See Figure 5.)

SECURITY AND IT SERVICES

In addition to the performance testing, Tolly Group engineers conducted an evaluation of some of the security, resiliency, and services features offered by the iShared Server and iShared Remote appliances.

Security testing: One of the main security features offered by Packeteer with its iShared Server and iShared Remote appliances is compatibility with SMB (Server Message Block) packet signatures. By default, Microsoft Windows Server 2003 and Microsoft Windows XP Professional operating systems come with SMB signatures enabled which raises the level of security when sending/ receiving data packets across LAN/WAN networks. This SMB signature reduces the chance that an attacker sniffs the packets and re-sends them with malicious

purposes. Our hands-on testing confirms that the Packeteer appliances support SMB signing, and at the same time does not compromise performance of the WAFS or iShared Exchange solution. For this project, Tolly Group engineers conducted all performance tests described in this document with SMB signing enabled.

IT services: Another set of features offered by Packeteer is iShared IT Services. iShared Remote is the platform for common IT Windows environment services such as net-

Packeteer iShared IT Services	
Services supported	
File	✓
Exchange	✓
Print	✓
Web caching	✓
DNS	✓
DHCP	✓

Source: The Tolly Group, September 2005

Figure 6

work shared printers, DHCP and DNS services, and Web caching (Proxy Server). (See Figure 6.) Tolly Group engineers configured each of the IT services and confirmed that they were fully functional in the remote network. For example, for the Web caching feature, engineers were able to configure the Internet browser Mozilla FireFox (ver. 1.0.6) and browse Web pages from the Web server without any problems.

WAN DISRUPTION TESTING

Tolly Group engineers ran a set of five WAN disruption tests comparing a WAN connection without the benefit of acceleration services to a WAN connection with the Packeteer solution to determine how the iShared Remote appliance behaves whenever there is an outage on the WAN. The first test involved transferring a file from the remote site to the headquarters site.

Using WAN connectivity without Packeteer iShared appliances, engineers took down the WAN connection and noticed the file-transfer process immediately aborted, displaying a "Windows Delayed File Write error." However, when the Packeteer solution was enabled, engineers did not spot any

errors or issues during the WAN disruption since the iShared Remote detected the outage and cached the operation. Even though there was no WAN connectivity between the iShared Server and the iShared Remote appliances, the end-user file was stored in the iShared Remote until the WAN connection was restored and then, the file was transmitted to the iShared Server and stored on the headquarters network drive. (See Figure 7.)

The second test consisted of breaking the WAN connection while saving a Wordpad document on the headquarters network drive. Engineers verified that the iShared appliances did not disrupt the saving process to the end user, since the changes to the file were stored on the iShared Remote and updated when the connection was restored.

However, without the benefit of the iShared acceleration, the Wordpad saving process hung and engineers were confronted with an application error message of "not responding." The third test consisted of editing the same Wordpad file that was saved to the backend server previously. Since the file was cached also on the iShared Remote, the changes were captured locally and updated to the backend after the connection was restored.

The fourth test verified that the iShared Remote appliance was able to maintain all cached files saved during a WAN outage. Engineers rebooted the appliance and saw that effectively the system maintained all files saved. In addition, the last test showed that those files that were already cached before the WAN disruption were accessible to the end user as "read-

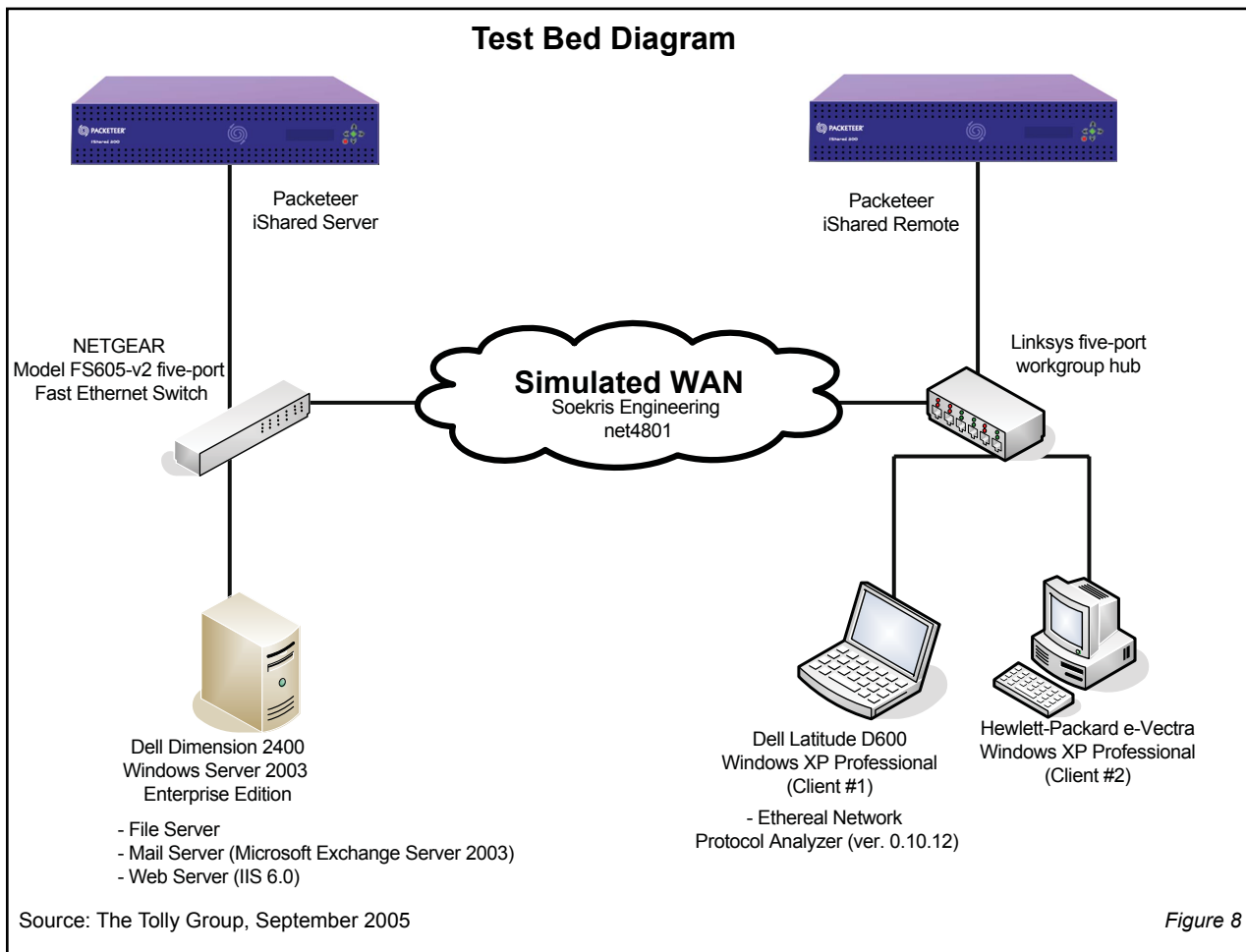
only" until the WAN connection was fully restored, enabling users to access critical data even if the WAN is down.

TEST CONFIGURATION AND METHODOLOGY

For performance and validation tests of Packeteer WAFS and other iShared IT Services, Tolly Group engineers tested the Packeteer iShared Server and iShared Remote. The server-side and remote-side (iShared Server and iShared Remote) are Microsoft Windows-powered appliances with Microsoft Windows Server 2003 Standard Edition installed and equipped with an Intel Xeon 2.4-GHz processor, 100GB of hard drive space and 1GB of RAM. In addition, both appliances come with Packeteer's Web Management Console pre-installed (software ver. 2.4.1.0).

Impact of Packeteer iShared on WAN Disruption Events		
WAN Disruption Test	WAN (No Packeteer Solution)	WAN with Packeteer Solution
"Drag and drop" file copy onto the target network drive. Break the WAN during the file copy.	File copy is interrupted with error message reporting that data may be lost or corrupted. Engineers also verified that file was corrupted on the file server.	File copy completes successfully without errors.
Using Wordpad, save document onto the target network drive. Break the WAN connection during the file save.	File save was interrupted with an error message reporting that data may be lost or corrupted. Engineers verified that the file was corrupted on the file server.	File save completes successfully without errors.
With the WAN down, continue to make edits and save onto the target network drive.	Does not apply. (Previous operation did not complete.)	File saves continue to complete successfully.
With the WAN down, after file copy or save, shutdown the iShared Remote appliance after two minutes and restore the WAN.	Does not apply. (Initial save/copy failed.)	The copy/save operation is reflected on the file server successfully after the WAN and the appliance power have been restored.
With the WAN down, attempt to access files from the target network drive.	The share/folder cannot be accessed.	Files can still be browsed and opened as "read-only" through the network drive.

Source: The Tolly Group, September 2005 Figure 7



Tolly Group engineers configured an additional Windows Server 2003 (Enterprise Edition) machine as a file server, Web server and E-mail server. The operating system and other applications were set up on a Dell Dimension 2400 equipped with a 2.66-GHz Intel Pentium 4 processor and 256MB of RAM. For the E-mail server side, engineers installed and configured Microsoft Exchange Server 2003 (Service Pack 1), and for the Web server side, engineers configured IIS (Internet Information Services) version 6.0 with default settings. Engineers utilized a Soekris Engineering net4801 (version 1.11) WAN emulation hardware and software switch (with three Fast Ethernet ports available) to provide the test environment with two simulated WAN link speeds tested: T1 (1.544 Mbps) and 512 Kbps.

From the client-side, engineers configured a Dell Latitude D600 laptop with Windows XP Professional (Service Pack 1) and Microsoft Office XP (Service Pack 2), equipped with a 1.3-GHz Intel Pentium M processor and 512MB of RAM. The second client that engineers configured was a Hewlett-Packard e-Vectra desktop with Windows XP Professional and Microsoft Office XP (Service Pack 2), equipped with a 600-MHz Intel Pentium III processor and 128MB of RAM.

Two five-port Fast Ethernet hub/switches (Linksys Workgroup Hub/NETGEAR Model FS605-v2 Fast Ethernet switch) were connected to create two independent networks. (See Figure 8.) The Soekris net4801 controlled bandwidth and latency between these networks. Both the I-shared Server appliance and Windows

Server 2003 file and mail server were connected to one network. The iShared Remote appliance and the two Windows XP clients were deployed on the adjacent network on the other side of the WAN emulator and simulated a client connection at various speeds (1.544 Mbps and 512 Kbps).

Test scenarios consisted of two performance tests (Response time improvement for file transfer and iShared Exchange Services) and three validation feature tests (WAFS — Wide Area File Services security, WAN Disruption and IT Services). For the performance tests, engineers logged both bandwidth utilization and response times across the LAN/WAN infrastructure as two different file types were transmitted — Microsoft Excel and Power-Point. Both programs were used since they

incorporate low- and high-bandwidth demands, from a basic calculation and word processing to graphical and image manipulation respectively. Each file was 4MB. Engineers used a standard stopwatch to take the response times. Ethereal Network Protocol Analyzer test tool (ver. 0.10.12) was used to capture the data and observe the bandwidth utilization across the network. The second pair of tests consisted of validating Packeteer claims in terms of security and user services for remote networks.

Tolly Group engineers tested WAFS performance by opening and saving shared files from a remote network.

Using a Windows-based PC, engineers ran five test scenarios: WAN file open, WAN file save, Packeteer cold file open, Packeteer warm file open, and Packeteer file save. The Packeteer cold open file represented the first pass of a file through the Packeteer appliances, while the Packeteer warm open file represents the second pass of a file through the acceleration appliances. Since the file has already been cached locally on the iShared Remote, it further reduces the amount of time required for the user to access the file.

The Soekris WAN emulator was used to throttle a Fast Ethernet network up to speeds of T1 (1.544

Mbps) and 512 Kbps with roundtrip latencies of 100ms and 250ms respectively. For the iShared Exchange Services test, engineers sent an E-mail using Microsoft Outlook from client #1 to client #2 and recorded the time necessary for client #2 to save a 4MB file attachment (both PowerPoint and Excel files). Lastly, engineers tested and validated the WAFS security by checking SMB signatures and the IT Services offered by the iShared Remote appliance such as print services, DNS, DHCP and Web caching.

The Tolly Group gratefully acknowledges the providers of test equipment used in this project.

Vendor	Product	Web address
Soekris Engineering, Inc. Public Domain	net4801 Switch ver. 1.1 Ethereal Analyzer ver. 0.10.12	http://www.soekris.com/net4801.htm http://www.ethereal.com

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PROJECT PROFILE

Sponsor: Packeteer, Inc

Document number: 206139

Product class: Application acceleration appliance

Products under test:

- iShared Server ver. 2.4.1.0
- iShared Remote ver. 2.4.1.0

Testing window: September 2005

Software status:

- Generally available

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