

# Sun Microsystems Inc.

## Sun Gigabit Ethernet Adapter 2.0

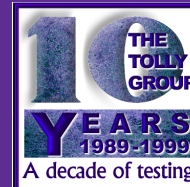
Competitive Evaluation vs. Alteon WebSystems, Inc. ACEnic, Phobos Corp. P1000 and Packet Engines, an Alcatel Co., GNIC II PCI Network Interface Card

*Premise: Today's network managers who want the largest networking connection possible to their high-end servers turn to Gigabit Ethernet. Not all Gigabit Ethernet adapters deliver the same throughput. The Tolly Group benchmarked the actual throughput of several major Gigabit Ethernet network interface cards (NICs).*

Sun Microsystems™, Inc. commissioned The Tolly Group to evaluate the Sun Gigabit Ethernet Adapter 2.0 against three Gigabit Ethernet adapters. Test results show that the Sun Gigabit Ethernet Adapter 2.0 outperformed all three of its competitors when tested in a Solaris 2.6 environment. In addition, the Sun Gigabit Ethernet Adapter 2.0 significantly outperformed its

<sup>1</sup> Sun Microsystems, Inc. revised its naming convention after Solaris 2.6, therefore following with Solaris 7.

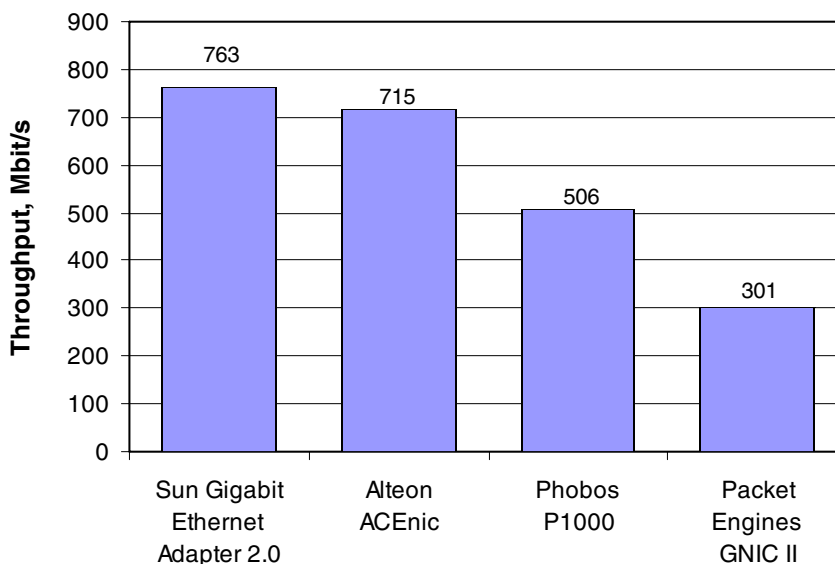
Test  
Summary



### Test Highlights

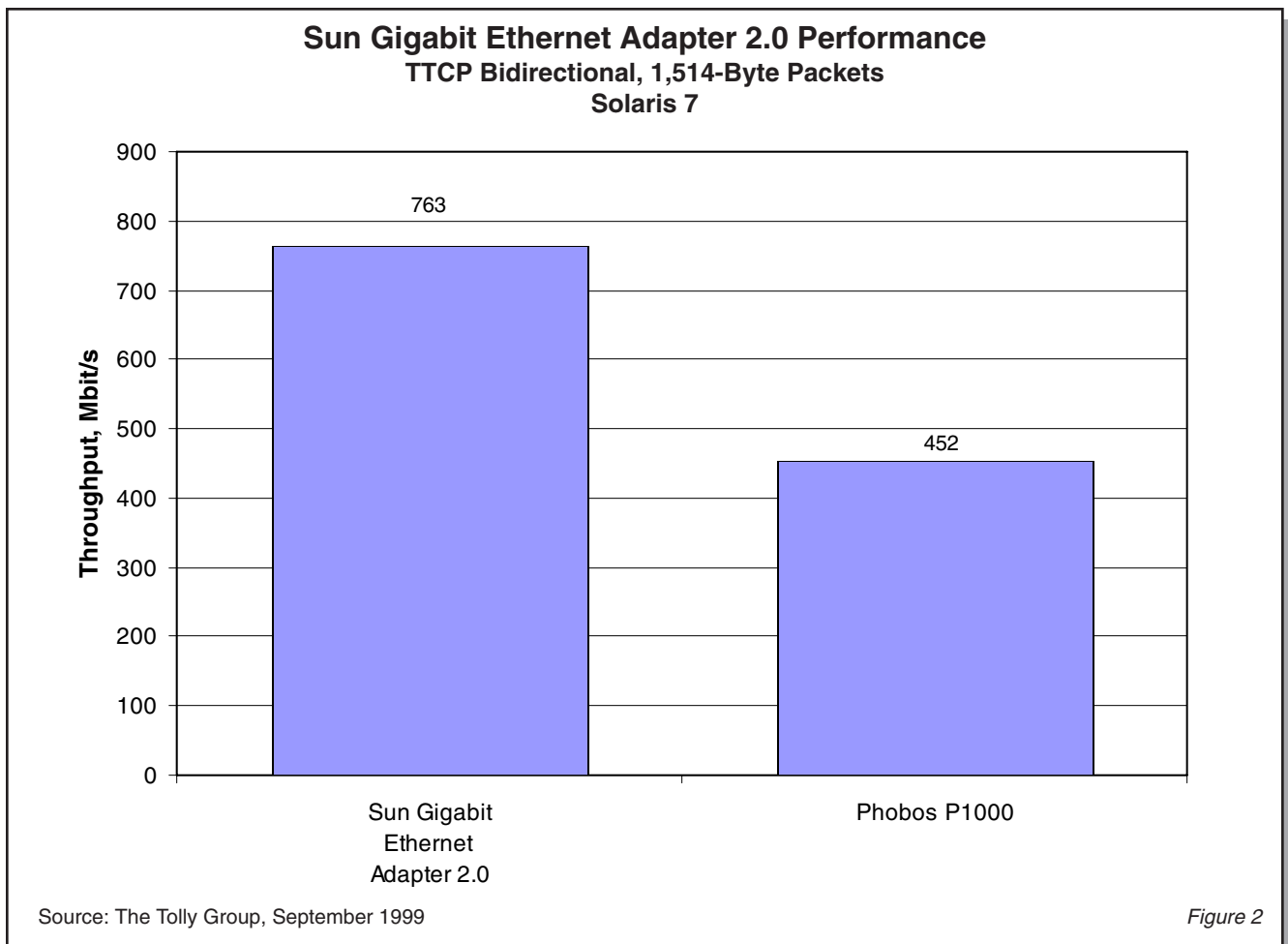
- Delivers the highest Gigabit Ethernet throughput of all competitors when forwarding bidirectional TTCP batch data
- Achieves a throughput of 763 Mbit/s in a Solaris 2.6<sup>1</sup> operating environment (32-bit mode)
- Processes 41% more throughput than the Phobos P1000 in a Solaris 7 operating environment (64-bit mode)

**Sun Gigabit Ethernet Adapter 2.0 Performance**  
TTCP Bidirectional, 1,514-Byte Packets  
Solaris 2.6



Source: The Tolly Group, September 1999

Figure 1



Phobos P1000 competitor when testing in a Solaris 7 environment.

All four PCI-based adapters were evaluated for full-duplex Gigabit Ethernet performance in a Sun Microsystems 336-MHz Enterprise 6500 Server with 12 processors running Solaris 2.6. TTCP, a traffic generation application based upon Chesapeake Computer Consultants, Inc.'s test TCP (TTCP), used 64-Kbyte packets and other parameters to provide traffic. In an almost identical environment, The Tolly Group measured the throughput of the Sun Gigabit

Ethernet Adapter 2.0 and the Phobos P1000 using Solaris 7. The test environment simulated transfer of large files, which should allow for optimal "streaming" performance from the devices under test. (The Sun Gigabit Ethernet Adapter 2.0 and the Phobos P1000 are the only available adapters that support Solaris 7.) Testing was performed in July 1999.

## RESULTS

### SOLARIS 2.6 THROUGHPUT

When testing throughput in a Solaris 2.6 operating envi-

ronment, results show that the Sun Gigabit Ethernet Adapter 2.0 forwarded throughput at 763 Mbit/s when initiating a TTCP bidirectional data transfer of 64-Kbyte packets. By contrast, the Alteon ACEnic delivered throughput of 715 Mbit/s, while the Phobos P1000 and the Packet Engines GNIC II fared lower, offering throughput of 506 Mbit/s and 301 Mbit/s, respectively. See figure 1.

### SOLARIS 7 THROUGHPUT

In a Solaris 7 operating environment, running on a Sun Ultra Enterprise 6500 that

allows the operating system to run in 64-bit mode, the Sun Gigabit Ethernet Adapter 2.0 again delivered throughput of 763 Mbit/s in tests using a TTCP bidirectional traffic flow of 64-Kbyte packets. The Phobos P1000, the only other adapter that supports Solaris 7, offered throughput of 452 Mbit/s, nearly 41% lower than the Sun adapter. See figure 2.

## ANALYSIS

### SOLARIS 2.6 THROUGHPUT

Investing in a Gigabit Ethernet adapter to get the most bandwidth possible for your network is a smart way of increasing bandwidth. With one Gigabit Ethernet card equal to the bandwidth of multiple Fast Ethernet adapters, the wise management choice is simply one card.

### SOLARIS 7 THROUGHPUT

Many of the vendors today that supply Gigabit Ethernet adapters are not yet providing drivers for the Solaris 7 operating environment. The advantages of Solaris 7 over Solaris 2.6 are primarily the 64-bit code that provides a potentially faster, more robust operating environment. Those adapters that support the 64-bit code such as the Sun Gigabit Ethernet 2.0 are leading the pack rela-

tive to the next generation of Solaris 7 support. In addition to supporting this improved operating environment, Gigabit Ethernet adapters need to process data effectively with high-speed throughput.

## TEST CONFIGURATION AND METHODOLOGY

The Tolly Group loaded Sun Gigabit Ethernet Adapters, version 2.0, on the following four Sun clients: a Sun Microsystems quad-processor 296-MHz UltraSPARC II Enterprise 450 with 512-Mbytes of RAM, acted as client machine No. 1 in a Solaris 7 configuration; a Sun Microsystems quad-processor 296-MHz UltraSPARC II Enterprise 450 with 1-Gbyte RAM, acted as client No. 2, attached to switch port 19; a Sun Microsystems dual-processor 336-MHz UltraSPARC II Enterprise 3000 with 1-Gbyte of RAM, acted as client No. 3, attached to switch port 21; a Sun Microsystems quad-processor 248-MHz UltraSPARC II Enterprise 4000 with 1-Gbyte of RAM, acted as client No. 4.

Engineers connected all four clients to a Foundry Networks, Inc. TurboIron/8 model number TS8F running software version 05.0.003T4. The eight-port Gigabit Ethernet switch also connected to

Sun Microsystems, Inc.

Sun Gigabit Ethernet Adapter 2.0



## Competitive Evaluation

### Sun Microsystems, Inc. Sun Gigabit Ethernet Adapter 2.0 Product Specifications\*

- High-performance Gigabit Ethernet Adapter
  - A high-performance adapter designed by Sun Microsystems to maximize system performance
  - Connects server-to-server and server-to-switch at gigabit speeds
- Support for full- and half-duplex modes of operation
- IEEE 802.3z compliance
  - Full compliance with industry standard IEEE 802.3z
  - Results in full interoperability with other 802.3z equipment, thus offers flexibility and investment protection
- Supports both PCI and SBUS
- Support for Sun platforms
  - Has gone through exhaustive integration tests with Sun platforms ranging from Ultra 5 to Enterprise 10000

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

### Adapter and Driver Information for Products Tested

Product Name	Driver Version	Driver Name	Driver Date	Duplex Mode
Sun Gigabit Ethernet Adapter 2.0	2.0	SUNWged	5/6/98 9:01 a.m.	Full
Phobos Corp. P1000	1.0	pge	6/11/99 4:41 p.m.	Full
Packet Engines, an Alcatel Co., GNIC II PCI Network Interface Card	1.1.0.0	peii	11/7/98 5:41 p.m.	Full
Alteon WebSystems, Inc. ACEnic	2.1.14	alt	3/31/98 5:43 p.m.	Full

Source: The Tolly Group, September 1999

Figure 3

a Sun Microsystems 12-processor 336-MHz Ultra-SPARC II Enterprise 6500 server, with 7Gbytes of RAM, that hosted all of the following adapter pairs under test: a PCI-based Sun Gigabit Ethernet 2.0 multi-mode fiber adapter, an Alteon WebSystems, Inc. ACEnic adapter; Phobos Corp. P1000 PCI-based multi-mode adapter; and Packet Engines GNIC II Network Interface Card. See figure 3 and 4.

To test the maximum throughput of the Gigabit Ethernet adapters under test in a bidirectional batch-traffic environment, The Tolly Group configured the SPARCserver with Sun Solaris 2.6 or Sun Solaris 7.

Each of the SPARCserver-resident adapters under test linked to the TurboIron/8 Gigabit Ethernet switch. One, two or four clients were connected to the switch to transfer data to and from the server. Engineers only used standard 802.3z frame sizes (64-, 512- and 1,518-byte frames) and recorded throughput in Mbit/s.

A Chesapeake Computer Consultants, Inc. TTCP Traffic Generator version 1.0, a Unix-compiled version, was configured on the server and on the clients. Engineers ran a TTCP script with a buffer size of 64 Kbytes, a packet size of 64 Kbytes and a TTCP window size of 64 Kbytes. The script sent a single stream for

each stream of bidirectional traffic for a total of two minutes with an incremental number of buffers. The buffers were incremented by 1,000, starting at 30,000 and ending with 33,000. Each test was repeated four times and averaged.

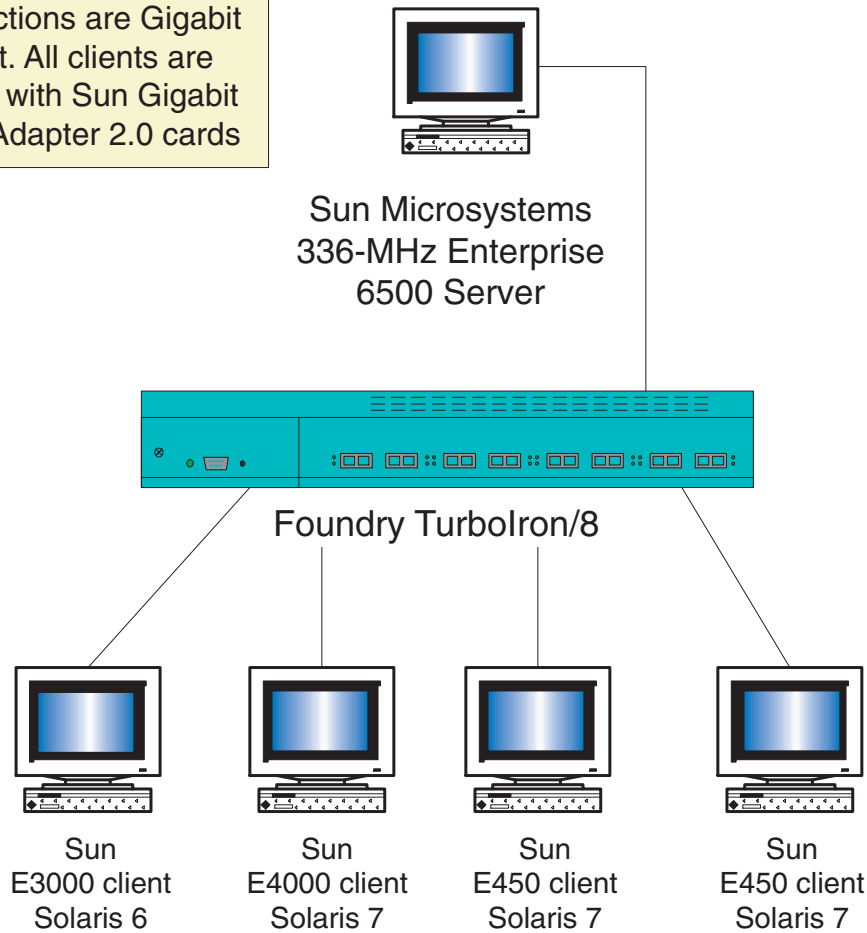
Test results were reported by TTCP as the average aggregate throughput in Mbit/s.

#### EQUIPMENT ACQUISITION AND SUPPORT

All competitive products were acquired through normal product distribution channels. The Tolly Group contacted executives at the vendor companies and invited them to provide a

## Test Bed

All connections are Gigabit Ethernet. All clients are equipped with Sun Gigabit Ethernet Adapter 2.0 cards



Source: The Tolly Group, September 1999

Figure 4

higher level of support than available through normal channels. All vendors accepted the invitation with the exception of Packet Engines, which said it did not wish to support the tests. All software levels were tested as supplied and phone technical support was used to configure/tune the device for the test suites executed by The Tolly Group

The Tolly Group verified product release levels and shared test configurations with the vendors in order to give them an opportunity to optimize their devices for the tests. Results were shared with the competitive vendors. Phobos acknowledged the accuracy of the test results. Alteon did not respond when The Tolly Group forwarded the results. For a more com-

plete understanding of the interaction between The Tolly Group, Alteon, Phobos and Packet Engines, check out the Technical Support Diary for Competitive Products Tested posted on The Tolly Group's World Wide Web site at <http://www.tolly.com>. See document 199130.

## SIDEBAR: THE ADVANTAGE OF TTCP

*Chesapeake Computer Consultants, Inc. Test TCP (TTCP) generates TCP and UDP traffic on IP-based networks.*

*Chesapeake identifies TTCP as a traffic generation and measurement tool, not a network traffic analyzer. The current version, TTCP 1.0, is provided as either a Java application or as Unix source code.*

*TTCP has an advantage over tools like FTP. If you have a high performance network, it is difficult for any single computer system to transfer data to or from disk at rates that are sufficient for real network testing. TTCP achieves high performance by filling a memory buffer with data, then repeatedly transmitting this data. Since everything is running from memory, you have a traffic transmitter and receiver that can operate at true network speeds.*

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

Vendor	Product	Web address
Chesapeake Computer Consultants, Inc.	TTCP	<a href="http://www.ccci.com">http://www.ccci.com</a>



Since its inception, The Tolly Group has produced high-quality tests that meet three overarching criteria: All tests are objective, fully documented and repeatable.

We endeavor to provide complete disclosure of information concerning individual product tests, and multiparty competitive product evaluations.

As an independent organization, The Tolly Group does not accept retainer contracts from vendors, nor does it endorse products or suppliers. This open and honest environment assures vendors they are treated fairly, and with the necessary care to guarantee all parties that the results of these tests are accurate and valid. The Tolly Group has codified this into the Fair Testing Charter, which may be viewed at <http://www.tolly.com>.

### PROJECT PROFILE

**Sponsor:** Sun Microsystems, Inc.

**Document number:** 199130

**Product class:** Gigabit Ethernet Adapters

#### Products under test:

- Sun Gigabit Ethernet Adapter 2.0
- Alteon WebSystems, Inc. ACEnic adapter
- Phobos Corp. P1000 adapter
- Packet Engines GNIC II Network Interface Card

**Testing window:** July 1999

#### Software status:

- Readily available

#### Additional information available:

- Technical Support Diary
- Configuration Files
- Data Files

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