Madge Networks
Smart 16/4 PCI Ringnode Mk3 (Wake-on-LAN) & Presto PCI Plus
Token-Ring Adapter Application Throughput for
Transaction Processing and IP File Transfers

Test Summary

Premise: *The majority of token-ring users consist of large institutions and other organizations that rely on transaction-based processing for their everyday mission-critical business applications. The buyers of token-ring LAN adapters need to know the adapter performance while handling the network traffic typically found in these environments.*

Madge Networks commissioned The Tolly Group to benchmark the performance characteristics of several LAN adapters, while handling LAN traffic patterns commonly found on token-ring networks. The Tolly Group examined Windows NT 4.0 Server IP throughput of Madge's Smart 16/4 PCI Ringnode Mk3 (WoL) and Presto PCI Plus, versus three other token-ring adapters: 3Com's TokenLink Velocity XL PCI, IBM's 16/4 Token-Ring PCI Adapter 2 with Wake on LAN, and Olicom's RapidFire 3140 Token-Ring 16/4 PCI Adapter. Unlike earlier tests of the same products, this round of tests focused on transaction-based processing, in addition to tests of file transfer throughput. Testing was performed in December 1998.

Test results show that both the Madge Smart 16/4 PCI Ringnode Mk3 (WoL) and Presto PCI Plus outperformed all other adapters tested, when handling

Test Highlights

○ Delivers higher aggregate throughput than competing adapters while processing client transactions that simulate business applications commonly run in token-ring networks

○ Achieves near wire-speed throughput while handling unidirectional file uploads or downloads in a 16 Mbit/s switched token-ring environment

○ Delivers greater than 29 Mbit/s of throughput in a DTR (full duplex) token-ring environment

IP Transaction Processing Throughput
"Inquiry Long" Test Script for NT Server 4.0/Multiple NT 4.0 Clients
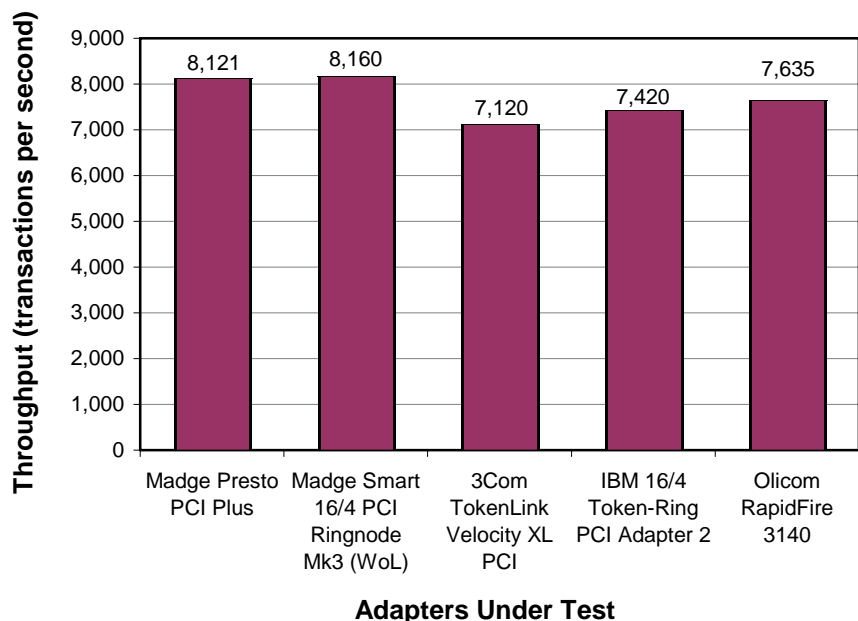
Source: The Tolly Group, January 1999

Figure 1

simulated transactions. The results also show that both Madge adapters offer near wire-speed performance when processing large file transfers.

RESULTS

TRANSACTION PROCESSING

The transaction processing throughput results show the throughput capability of the adapter under test, while handling simulated database transactions to an NT 4.0 Server (see figure 1). During tests involving Ganymede's Chariot Inquiry Long script, the Madge Smart 16/4 PCI Ringnode Mk3 (WoL) processed 6.9% more transactions per second (tps) than its nearest competitor (Olicom RapidFire 3140). The Smart Ringnode Mk3 delivered 10% more than the IBM 16/4 Token-Ring PCI Adapter 2 with Wake on LAN and handled 14.6% more transactions than the 3Com TokenLink Velocity XL PCI. The Madge Presto PCI Plus also out-performed the competition, processing between 6.4% to 14.1% more transactions than the competitive adapters.

A second battery of tests was conducted to determine the trans-action processing throughput of the adapters under test, while handling short transactions emulating a series of credit approvals (see figure 2). During tests involving Ganymede's Chariot Credit Long script, the Madge Smart 16/4 PCI Ringnode Mk3 (WoL) processed 2.1% more tps than its nearest competitor (Olicom RapidFire 3140). The Smart 16/4 PCI Ringnode Mk3 (WoL) processed 8.2% more transactions than the IBM 16/4 Token-Ring PCI Adapter 2 with Wake on LAN and 14.8% more than the 3Com TokenLink Velocity XL PCI. The Madge

IP Transaction Processing Throughput
"Credit Long" Test Script for NT Server 4.0/Multiple NT 4.0 Clients
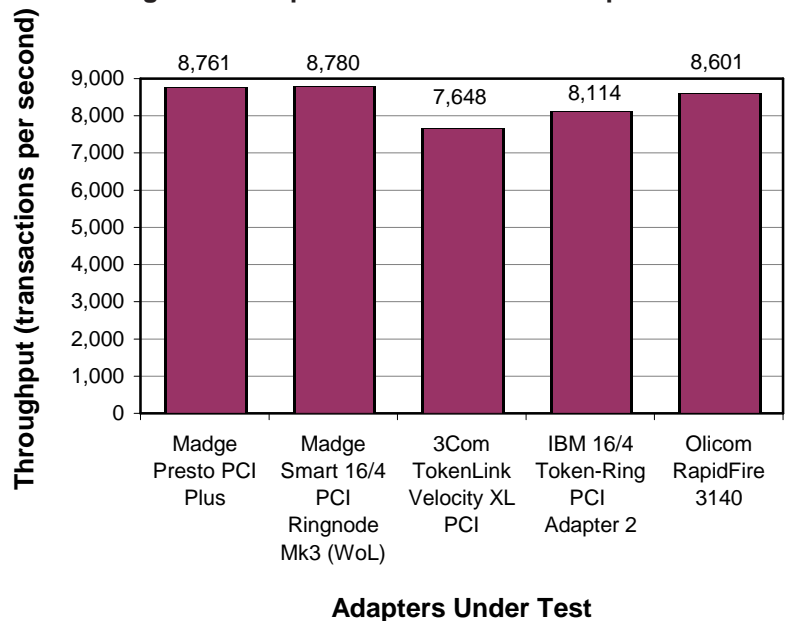
Source: The Tolly Group, January 1999   *Figure 2*

Presto PCI Plus also outperformed the competition, processing between 1.9% to 14.6% more transactions than the competitive adapters.

UNIDIRECTIONAL FILE TRANSFERS

Unidirectional file transfer results show that all adapters under test deliver wire-speed throughput during large file transfers (see figure 3). During tests involving Ganymede's Chariot File Send Short script, the Madge Smart 16/4 PCI Ringnode Mk3 (WoL) and Presto PCI Plus each delivered 98.1% of the theoretical maximum throughput, or 15.7 Mbit/s (of 16 Mbit/s).

BIDIRECTIONAL FILE TRANSFERS

To ascertain the performance of the adapters when configured in DTR mode, engineers used Ganymede's Chariot Notes Receive script to simulate the traffic profile of Lotus Notes E-mail transfers in both directions (i.e., client-to-server and

server-to-client). Results show that the Madge Smart 16/4 PCI Ringnode Mk3 (WoL) utilized 91.9% of the maximum theoretical bandwidth (29.4 Mbit/s out of 32 Mbit/s). (See figure 4.) The Presto PCI Plus utilized 91.6% (29.3 Mbit/s) and all adapters utilized at least 90% (28.8 Mbit/s).

For a complete set of results see figure 5.

ANALYSIS

Major advances in silicon tech-nology continue to deliver wire-speed networking solutions to the IT industry. That said, it's no surprise that LAN adapter vendors have delivered near wire-speed performance, especially when handling large file transfers. In fact, it's equally valuable to under-stand the performance difference of token-ring adapters when handling transaction-type traffic.

The Tolly Group conducted bench-marks to ascertain how well the adapters under test handle traffic

profiles common to industries where token-ring is popular, including financial corporations, manufacturing concerns, airlines, and the government. Typical usage of the LAN in these sectors include processing credit inquiries, balance inquiries, transaction instructions, accessing booking systems or databases to handle user requests, process control and financial transactions. The Tolly Group used two Chariot scripts (inquiryl & creditl) to gauge each adapter's performance while handling transaction-type traffic. During these tests both Madge adapters proved more effective than the competition when handling simulated database transactions and credit approvals.

Two additional Chariot scripts (filesnds & notesrcv) were run to validate the premise that token-ring LAN adapters deliver wire-speed throughput when handling large file transfers. These tests supported our hypothesis. All of the adapters under test delivered near wire-speed throughput when handling either unidirectional or bidirectional file transfers.

Related Tests

The Tolly Group has run similar tests on a number of token-ring adapters. When looking at these test results, it is important to recognize that the results can vary if test parameters such as the number of clients, the number of sessions, frame size, server type, and the transaction-processing type are modified. The same adapters can show somewhat different results depending on the specific parameters used.

Test Configuration and Methodology

Madge Networks obtained the adapters under test through normal distribution channels, and The

Tolly Group tested using the latest available drivers (see figure 6). The Tolly Group tested IBM's PCI Wake on LAN Token-Ring Adapter P/N 34L0701.

The Tolly Group installed Microsoft NT Server 4.0 with Service Pack 3 on dual 400 MHz Pentium-II based, PCI-bus, Compaq Computer Corp. Proliant 1600s equipped with 128 Mbytes of RAM and the adapter under test. Engineers installed Microsoft NT Workstation 4.0 with Service Pack 3 on four 233-MHz Pentium-based, PCI bus, Micron Technologies, Inc. ClientPro Vxes equipped with 64 Mbytes of RAM and Madge Smart 16/4 PCI Ringnode Mk3 (WoL) LAN adapters. Ganymede Software version 2.2 was installed on both the server and client stations. The server and the clients were connected via dedicated 16 Mbit/s full-duplex connections to a Madge Smart DeskStream Token Ring Switch (model DeskStream, Software: current image v1.1, factory image v1.0.7, upgrade image v1.1, boot strap v1.0.1, Build Time: 10Sep98 15:51). All switch ports were configured in DTR mode as concentrator ports, and spanning tree was enabled. The maximum frame size of the Madge Smart DeskStream Token Ring Switch was set to 4096, a typical maximum fram size in token-ring environments. See figure 7 for the test bed diagram.

The Tolly Group benchmarked TCP/IP application throughput with Ganymede Software's Chariot using transaction based scripts (inquiryl.scr and creditl.scr), and IP file transfer scripts (filesnds.scr and notesrcv.scr). During the Inquiry Long (inquiryl.scr) tests, 166-byte requests and responses were sent in both directions (i.e., client-to-server and server-to-

**Madge Networks
Presto PCI Plus and Smart 16/4 PCI Ringnode MK3 (WoL) Token-Ring Adapters
Product Specifications***

Presto PCI Plus
❍ Part No. 60-06
❍ Price $169
❍ 16/4 Mbit/s auto-detect
❍ Drivers for DOS, OS/2, Windows and NetWare
❍ ACPI 1.0 compliant
❍ High security — non-promiscuous

Smart 16/4 PCI Ringnode Mk3 (WoL)
❍ Part No. 51-04
❍ Price $240
❍ 16/4 Mbit/s auto-detect
❍ Drivers for DOS, OS/2, Windows, UNIX, Macintosh and NetWare
❍ PC99 and ACPI 1.0 provides future-proofed investment protection
❍ Remote wake-up via Wake-on-LAN connector
❍ Hot-standby Server Adapter Mirroring for resilient connections to mission-critical servers
❍ PCI Hot Plug support for NetWare and NT servers
❍ Remote Boot capability
❍ Promiscuous-capable (can be permanently disabled for security)

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*Vendor-supplied information not verified by The Tolly Group

client). During the Credit Long (creditl.scr) tests, 166-byte records were sent from client to server and 67-byte confirmations were sent back. During the Notes Receive (notesrcv.scr) tests, 116-byte requests were sent from client to server and 2,066-byte E-mail messages were sent back. The Credit Long and Notes Receive tests ran in both directions, in that the traffic profiles described above were also verified in the opposite direction (i.e., from server to client). During the File Send Short (filesnds.scr) tests, large files were transferred in one direction (i.e., clients uploaded files to the server using 4K-byte frames) and 66-byte acknowledgements were sent back. All Chariot scripts were used in their standard unmodified form.

Initially the NT 4.0 Server, the NT 4.0 Workstation clients, and a Wandel & Goltermann DA-320 Analyzer were connected to a 16 Mbit/s token-ring MAU. The Wandel & Goltermann DominoLAN DA-320 Analyzer verified frame sizes on the LAN for the different Chariot scripts.

During the actual tests, all devices were connected to the Madge Smart DeskStream Token Ring Switch via dedicated 16 Mbit/s full-duplex connections and application throughput was measured via the Chariot console. From an application point-of-view, aggregate throughput will never reach 100% of the theoretical maximum since the lower layers of the stack add header and trailer information to the application data being transferred. All Chariot scripts were left unmodified and default values were used. Each test was configured to run for three minutes. Three iterations of each test were performed and those results were then averaged to produce the final results.
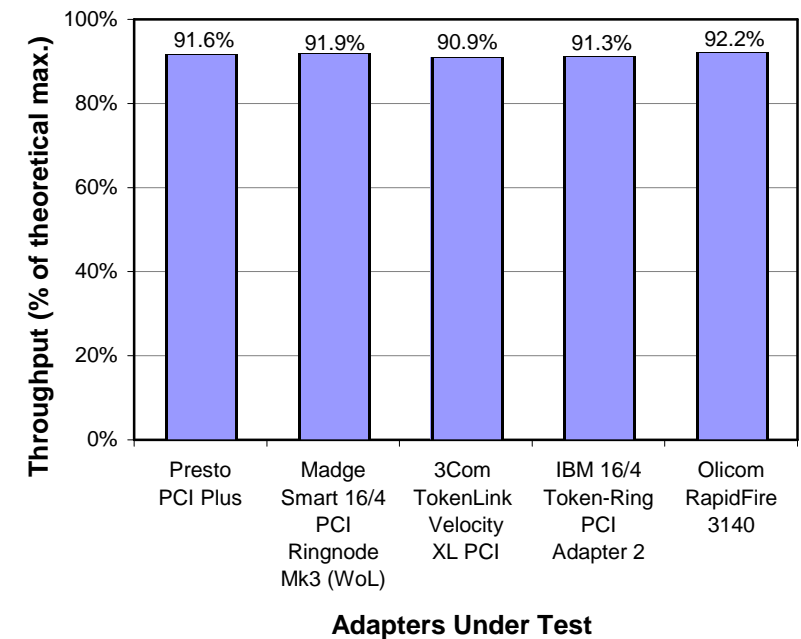
The Credit Long (creditl.scr) and

**NT4.0 Server/Multiple NT 4.0 Client
Unidirectional IP File Transfers**
"File Send Short" Throughput (1% of Theoretical Max - 16 Mbit/s)
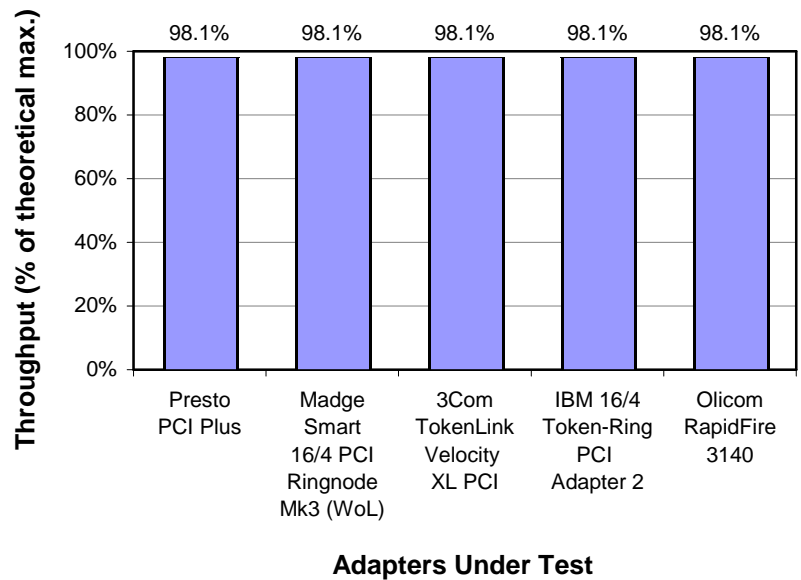
Source: The Tolly Group, January 1999   *Figure 3*

**NT4.0 Server/Multiple NT 4.0 Client
Bidirectional IP File Transfers**
"Notes Receive" Throughput (1% of Theoretical Max - 32 Mbit/s)

Source: The Tolly Group, January 1999   *Figure 4*

NT 4.0 Server/Multiple NT 4.0 Client Throughput Results

IP Transaction Processing — Aggregate Throughput (tps)

Chariot Script	Presto PCI Plus	Madge Smart 16/4 PCI Ringnode Mk3 (WoL)	3Com TokenLink Velocity XL PCI	IBM 16/4 Token-Ring PCI Adapter 2	Olicom RapidFire 3140
Credit Long	8,761	8,780	7,648	8,114	8,601
Inquiry Long	8,121	8,160	7,120	7,420	7,635

IP File Transfers — Aggregate Throughput (Mbit/s)

Chariot Script	Presto PCI Plus	Madge Smart 16/4 PCI Ringnode Mk3 (WoL)	3Com TokenLink Velocity XL PCI	IBM 16/4 Token-Ring PCI Adapter 2	Olicom RapidFire 3140
File Send Short	15.7	15.7	15.7	15.7	15.7
Notes Receive	29.3	29.4	29.1	29.2	29.5

Source: The Tolly Group, January 1999

Figure 5

Inquiry Long (inquiryl.scr) tests simulate network traffic that a series of credit approvals and database transactions would create, respectively. Although the network traffic looks like trans-actions are being processed, there is no actual back-end processing taking place. The simulated tps metrics are valid for comparative purposes and should not be construed as the actual capacity of an NT 4.0 system.

Similarly, for the Notes Receive (notesrcv.scr) and File Send Short (filesnds.scr), no actual file access is taking place. The notes-rcv script was used to gauge how well the adapters could handle E-mail transactions. This script simulates the receipt of an E-mail by a Lotus Notes client. Traffic was sent in both directions to simulate E-mail file transfers to and from the client. The filesnds script simulates a unidirectional file transfer.

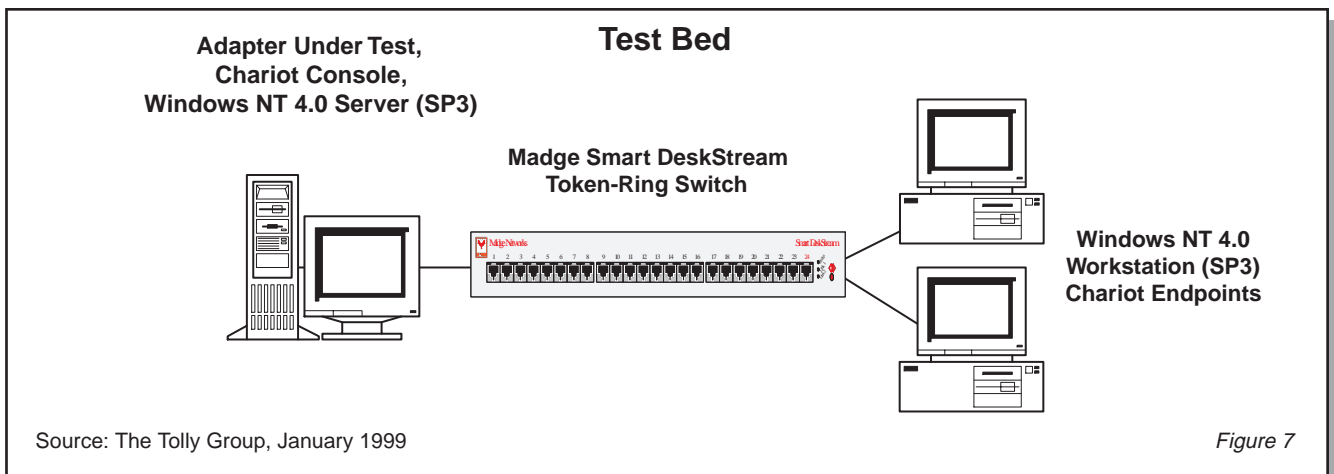## EQUIPMENT ACQUISITION AND SUPPORT

All competitive equipment was acquired through normal product distribution channels. The Tolly Group contacted management at the vendor companies and invited them to provide a higher level of support than available through normal channels. The vendors accepted that offer and provided phone technical support to configure/tune the

NT 4.0 Server Driver Information

Vendor	Product Name	Name	Size (bytes)	Creation Date	Creation Time
Madge Networks	Presto PCI Plus	MDGMPORT.SYS	179,136	August 10, 1998	6:10 AM
Madge Networks	Madge Smart 16/4 PCI Ringnode Mk3 (WoL)	MDGMPORT.SYS	179,136	August 10, 1998	6:10 AM
3Com Corp.	TokenLink Velocity XL PCI	TLNKP.SYS	39,520	December 9, 1997	4:39 PM
IBM Corp.	PCI Adapter 2 with Wake on LAN (P/N 34L0701)	IBMTRP.SYS	105,744	August 28, 1998	11:29 AM
Olicom Inc.	RapidFire 3140 Token-Ring 16/4 PCI Adapter	OCT3XND3.SYS	157,696	July 29, 1998	1:13 AM

Source: The Tolly Group, January 1999

Figure 6

Test Bed

Adapter Under Test, Chariot Console, Windows NT 4.0 Server (SP3)

Madge Smart DeskStream Token-Ring Switch

Windows NT 4.0 Workstation (SP3) Chariot Endpoints

Source: The Tolly Group, January 1999   *Figure 7*

adapters 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. For a more complete understanding of the interaction between The Tolly Group, 3Com, IBM and Olicom, 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 199102).

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

Vendor	Product	Web address
Ganymede Software, Inc.	Chariot Version 2.1	www.ganymedesoftware.com
Wandel & Goltermann Technologies, Inc.	DominoLAN DA-320	www.wg.com

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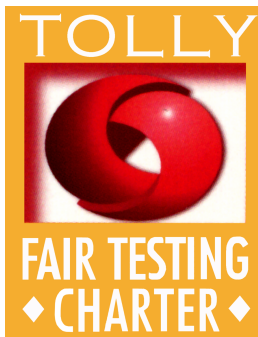
Since its inception, The Tolly Group has produced high-quality tests that meet three overarching criteria: All tests are objective, fully documented and repeatable.

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: Madge Networks
Document number: 199102
Product Class: Token-Ring Adapter
Products under test:
- Madge Presto PCI Plus
- Madge Smart 16/4 PCI Ringnode Mk3 (WoL)
- 3Com TokenLink Velocity XL PCI
- IBM Corp. PCI Wake on LAN Token-Ring Adapter 2 with Wake on LAN (P/N 34L0701)
- Olicom RapidFire 3140 Token-Ring 16/4 PCI Adapter

Testing window: December 1998
Software status:
- All drivers are production code

For more information on this document, or other services offered by The Tolly Group, visit our World Wide Web site at http://www.tolly.com, send E-mail to