The Tolly Group

Project Report

Sponsor: 3M

3M VOL-4000 Fast Ethernet Switch and
3M N100VF Fast Ethernet Adapter Benchmark

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Report Status: Draft

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Table of Contents

Findings

Premise

The cost attractions of fiber-to-the-desk (FTTD) solutions will be of little value if customers must suffer reduced performance to leverage greater savings in cabling infrastructure. That is, FTTD can only become a viable customer solution if FTTD products, such as NICs, switches, and media converters can deliver performance at or near that of their copper counterparts.

Project Overview

3M commissioned The Tolly Group to benchmark the performance of its VOL-4000 Fast Ethernet switch and N100VF Adapter in support of a white paper currently in progress at The Tolly Group. The tests focused upon Fast Ethernet full-duplex performance. Switch tests focused upon (a) full-mesh, zero-loss (<0.001%), steady-state, bidirectional packet-per-second (PPS) throughput and (b) Last In/Last Out latency. Adapter/NIC tests focused upon bidirectional effective user data throughput (exclusive of headers, trailers, retransmissions, etc).

Findings

The switch tests demonstrated that the VOL-4000 can forward traffic at 100% of the theoretical maximum packet rates, whether the traffic consists of 64-, 512-, or 1,518-byte packets. See figure 1.

VOL-4000 (VF-45 Multimode Fiber Optic) 32-Port Fast Ethernet Switch Layer 2 Fast Ethernet Wire-Speed Switching Performance
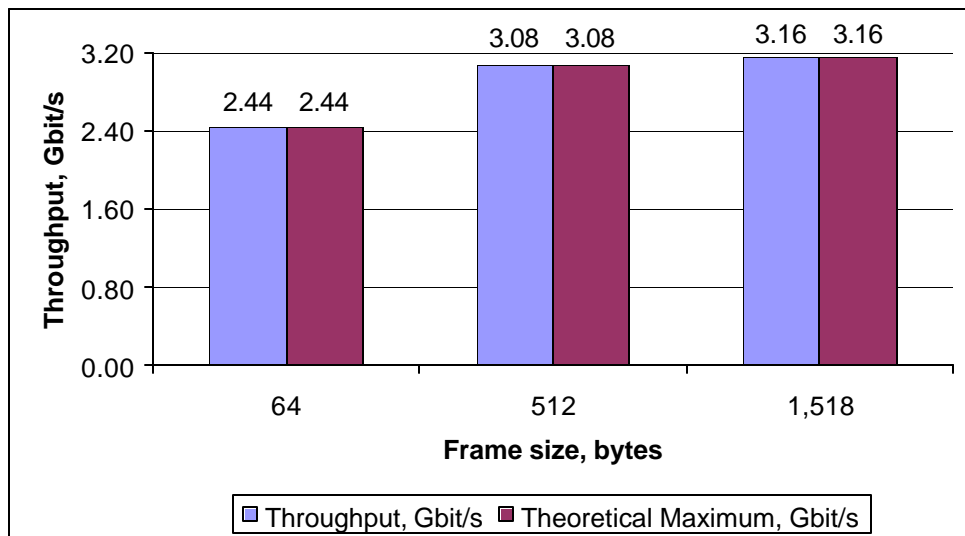
Source: The Tolly Group, 2000   Figure 1

Document Source: Test Results\Production Test Results\me5re01a.xls [Worksheet: "Graphics"]

The tests also demonstrated latency (First In / First Out, or FIFO, i.e., including insertion delay) of less than one hundredth of a millisecond with the smallest frame size, and approximately one eighth of a millisecond with the largest frame size. This translates to less than five *micro*seconds above the insertion delay (i.e., Last In / First Out LIFO delay). See figure 2.

VOL-4000 (VF-45 Multimode Fiber Optic)
32-Port Fast Ethernet Switch Latency

3M VOL-4000 Fast Ethernet Frame Latency, Microseconds, at 1% Theoretical Maximum Unidirectional Load	FIFO Latency, microseconds	LIFO Latency, microseconds
64-byte Frames	9.40	3.64
512-byte Frames	45.60	4.00
1,518-byte Frames	127.10	5.02

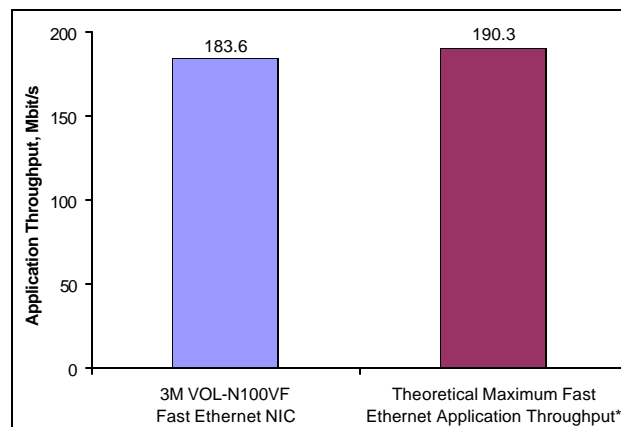Source: The Tolly Group, 2000   Figure 2

Figure Source: Test Results\Production Results\me5ra01e.xls [Worksheet: "Summary for White Paper"]

The tests also demonstrated that VF-45 enabled NICs deliver near-wire-speed performance. Specifically, The Tolly Group tested 3M Volition NICs (VOL-N100VF) and observed application throughput of more than 180 Mbit/s on a single, full duplex Fast Ethernet server NIC. Unlike the packet-per-second tests referenced above, these tests focused on effective user data, excluding framing, headers, acknowledgements, etc. Based upon even the absolute minimum overhead required, the 3M Volition adapter still delivered 96.5% of the theoretical maximum application throughput of a full duplex Fast Ethernet connection. See figure 2.

VOL-N100VF (VF-45 Multimode Fiber Optic) NIC,
Full Duplex Fast Ethernet Application Throughput

Source: The Tolly Group, 2000   Figure 2

Document Source: Test Results\Production Test Results\me5re02a.xls [Worksheet: "Graphics"]

Analysis

The testing demonstrated that the VOL-4000 switch offers wire-speed throughput in all frame sizes, and that the VOL-N100VF delivers near-wire-speed throughput. The testing also revealed that the VOL-4000 does not suffer from head-of-line blocking. This means that the VOL-4000 and VOL-N100VG represent viable options for customers looking for high-performance active components to complement their high-performance fiber optic cabling solutions.

Detailed Test Information

Detailed Test Methodology
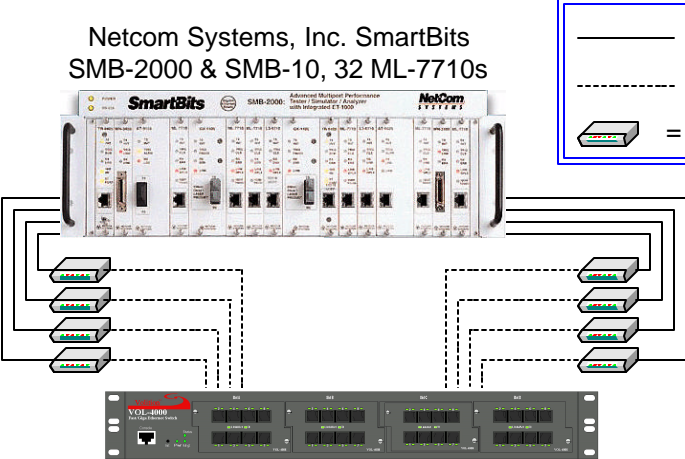
Test Configurations, Permutations, and Variations

Benchmark Name	VF-45 Layer 2 Fast Ethernet Switch Throughput Performance
Test Name(s)	Throughput, Latency, Head-of-Line Blocking

Permutation 1:
   Performance Test
	Three permutations:
	   Full Mesh, Zero-Loss, Steady-State Bidirectional Packet Per Second (PPS)
	   Throughput (SmartBits "X-Stream");
	   Latency;
	   Head-of-Line Blocking (1518-byte frame size only).

Permutation 2:
   Frame Size
	Three permutations:
	   64 bytes (including CRC);
	   512 bytes (including CRC);
	   1,518 bytes (including CRC).

Permutation 3:
   LAN Topology
	One permutation:
	   Fast Ethernet 100 Mbit/s.

Permutation 4:
   System Under Test
	One permutation:
	   VOL-4000.

Permutation 5	N/A
Total # Tests	7
Iterations / Test	3
Total Iterations	21
Other Notes	

Benchmark Name	NIC Performance
Test Name(s)	Throughput Performance

Permutation 1:
   Traffic profile
	One permutation:
	   Bidirectional Batch Traffic (Chariot – File Send Long script).

Permutation 2:
   Duration
	One permutation:
	   180 seconds.

Permutation 3:
   Adapter Topology
	One permutation:
	   Fast Ethernet.

Permutation 4: System Under Test	One permutation: VOL-N100VF.
Permutation 5: Operating System	One permutation: Windows NT Workstation 4.0 Service Pack 4.
Total # Tests	1
Iterations / Test	3

Total Iterations	3
Other Notes	

Benchmark Information

Benchmark Name	VF-45 Layer 2 Fast Ethernet Switch Throughput Performance
Test Name	Throughput, Latency, Head-of-Line Blocking
Licensing	© The Tolly Group. The Tolly Group grants you limited rights to use The Tolly Group Benchmark Methodologies. The Tolly Group grants you a non-commercial, non-exclusive, non-transferable license to use the benchmark methodologies for the sole purpose of conducting benchmark tests to measure the performance and/or validate features and functions of networking devices. The Tolly Group hereby grants you the right to publish the results obtained with the benchmark methodologies provided that with the publication of each result you identify The Tolly Group as the source of the benchmark, the name and version number of the benchmark methodology.
Test Description/Objective	This test will validate the performance of the switch under test in areas critical to network operation.
Test Methodology: Environment	The test environment will include: At least one system under test equipped with VF-45 interfaces; At least one SMB-2000 with 32 ML-7710 10/100 Ethernet Interfaces connected via RJ-45/VF-45 media converters.
Permutations/ Variations	Performance Test Metric: Aggregate Zero-Loss (<0.001%), Bidirectional, Steady-State Throughput (packets per second, Mbit/s); Latency; Head-of-Line Blocking (1,518-byte frames only). Systems Under Test: VOL – 4000 Fast Ethernet Switch. Frame Sizes: 64-, 512-, 1,518-bytes. Iterations: 3.
Hardware/Software Required	Thirty-two Layer 2 10/100 Mbit/s Ethernet switch ports. Netcom Systems, Inc. SmartBits Advanced Multiport Performance Tester/Simulator/Analyzer SMB-2000 equipped with ML-7710 10/100 Mbit/s Ethernet interfaces. Netcom Systems Smart Applications version 2.30, Advanced Switch Test version 2.10, and Advance Switch Test (Xstream) version 2.10. Thirty-two ports of RJ-45/VF-45 media converters. One server with a single Fast Ethernet NIC.
Configuration	The switch under test was connected to two Netcom Systems SmartBits Advanced Performance Tester/Simulator/Analyzers, consisting of an SMB-2000 and one SMB-10 chassis running SmartApplications version 2.30, Advanced Switch Tests version 2.10, and Advanced Switch Test (Xstream) version 2.10. The SmartBits chassis was connected to the switch under test via thirty-two port RJ-45/VF-45 media converters
Measurements	The Tolly Group will record data throughput as reported by SmartBits.

Test Methodology: Procedure	For "Full Mesh" test: a) Connect each port under test on the system under test to the SMB-2000; b) Execute the Advanced Switch Test (Xstream) test; c) Determine the offered load level, in increments/decrements of 5% of the theoretical maximum packet per second (PPS) rate for the particular topology under test, at which the system will exhibit packet loss of no more than 0.001% For Latency test a) Connect thirty-two ports under test on the system under test to the SMB-2000; b) Offer 1% load to each port c) Record Last In / Last Out latency as reported by SmartBits for "Cut-Through Latency" measurement. For Head-of-Line Blocking test a) Connect four ports under test on the system under test to the SMB-2000; b) Port one offers 50% load to port two, and 50% load to port four; port three offers 100% load to port two. (c) Initiate all traffic streams simultaneously from within SmartApps. (d) Record whether or not the stream from port one to port four (the uncongested egress port) exhibits loss. Zero loss represents a "pass" while non-zero loss represents a "fail." Execution a) The Tolly Group will execute three 60-second iterations for each frame size (64-, 512-, 1,518- bytes). b) SmartApps will transmit "learning" packets before each trial. The Tolly Group will configure the number of learning retries to three.
Test Bed Diagram	The following illustration depicts the logical placement of devices in the test bed.

Netcom Systems, Inc. SmartBits
SMB-2000 & SMB-10, 32 ML-7710s

———— = 100Base-T

- - - - - - = 100Base-F/ Volition

= RJ-45/VF-45 Media Converter

**3M VOL-4000
Fast Ethernet Switch**

Data Recording method	The Tolly Group will export data throughput from SmartBits tests directly to file and record aggregate data throughput.
Interpretation	This test will evaluate Layer 2 packets per second (PPS) performance of the VOL-4000 Fast Ethernet Switch.

Test Methodology: Special Notes/considerations	N/A
System Under Test Configuration Details	TBD
Script	N/A
Sample Spreadsheet	N/A
Related Methodologies	N/A
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Benchmark Name	VF-45 NIC Performance
Test Name	Throughput
Licensing	© The Tolly Group. The Tolly Group grants you limited rights to use The Tolly Group Benchmark Methodologies. The Tolly Group grants you a non-commercial, non-exclusive, non-transferable license to use the benchmark methodologies for the sole purpose of conducting benchmark tests to measure the performance and/or validate features and functions of networking devices. The Tolly Group hereby grants you the right to publish the results obtained with the benchmark methodologies provided that with the publication of each result you identify The Tolly Group as the source of the benchmark, the name and version number of the benchmark methodology.
Test Description/Objective	This test will validate the performance of the NIC under test.
Test Methodology: Environment	The test environment will include: At least one NIC under test. At least five simulated clients and one simulated server running Chariot Endpoint. At least one workstation (optionally, the server or one of the clients) running Chariot Console. A Chariot script configured to perform file transfers between the clients and the server for a duration of 180 seconds.
Permutations/ Variations	Network configuration: One server with N100VF 100Base-T adapter connected to Fast Ethernet switch. One Chariot console 3.1 and five Chariot endpoint 3.3 clients connected to the server via a Fast Ethernet switch. Measurement: Throughput as reported by Chariot for 10 "Pairs" running file transfers bidirectionally in Batch mode for 180 seconds.
Hardware/Software Required	NetIQ Corporation Chariot Console version 3.1 and six Endpoint clients version 3.3. (Chariot Console is co-resident with one Chariot Endpoint and simulates a server). One Volition Fast Ethernet switch.
Configuration	The one Chariot Console/Endpoint and five other Chariot Endpoints equipped with the adapters under test directly connected to the switch. The Chariot script was configured for ten pairs running for a fixed duration of 180 seconds, transferring 1,000,000 bytes.
Measurements	The Tolly Group will record data throughput as reported by Chariot.
Test Methodology: Procedure	For the Chariot Test: a) Run the File Send Long script bidirectionally with ten Chariot "pairs" such that five transfer data from a single simulated "server" to each of five simulated "clients," while another five transfer data from the five simulated "clients" to the single simulated "server." Configure "filesndl.scr" for a data transfer size of 1,000,000 bytes for a duration of 180 seconds for three iterations. b) Record throughput in Mbit/s as reported by Chariot.

Test Bed Diagram	The following illustration depicts the logical placement of devices in the test bed.

------------ = 100Base-F/ Volition

Wavetek Wandel Goltermann DominoFastEthernet DA-350 Protocol Analyzer

3M VOL-4000 Fast Ethernet Switch

Chariot Endpoint, Chariot Console

5 Chariot Endpoints:
3M VOL-N100VF NICs
with VF-45 transceivers

Data Recording method	The Tolly Group will record and export the throughput data based upon available test configurations and scripts within the Chariot test tool.
Interpretation	This test will evaluate the effective application throughput of the N100VF Adapter.
Test Methodology: Special Notes/considerations	N/A
System Under Test Configuration Details	TBD
Script	See Appendix.
Sample Spreadsheet	TBD
Related Methodologies	N/A
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Test Bed Configuration

Systems Under Test:

System 1.

Manufacturer	3M
Product	Volition Fast Ethernet Switch
Model	VOL-4000
Description	Thirty-two port Fast Ethernet switch with VF-45 interfaces
Version	4.14
Release Date (if Beta)	N/A
Serial Number	00120552
TTG tracking Number	N/A
Configuration	TBD
Notes	

System 2.

Manufacturer	3M
Product	Network Adapter
Model	N100VF
Description	100Base-T Adapter with VF-45 interface
Version	2.21
Release Date (if Beta)	
Serial Number	03116D
TTG tracking Number	N/A
Configuration	TBD
Notes	

Systems Not Under Test

System A.

Manufacturer	Netcom Systems, Inc.
Product	SmartBits 2000 Advanced Multiport Performance Tester/Analyzer/Simulator
Model	SMB-2000
Description	20-port network traffic simulator
Version	Firmware 6.60.0012 SmartApplications 2.30 Advanced Switch Test 2.10
Release Date (if Beta)	N/A
Serial Number	5431
TTG tracking Number	1155
Configuration	Equipped with twenty 10/100 Mbit/s full duplex Ethernet ML-7710 interfaces
Notes	

System B.

Manufacturer	Netcom Systems, Inc.
Product	SmartBits 2000 Advanced Multiport Performance Tester/Analyzer/Simulator
Model	SMB-10
Description	20-port network traffic simulator
Version	Firmware 6.60.0012 SmartApplications 2.30 Advanced Switch Test 2.10
Release Date (if Beta)	N/A
Serial Number	16656
TTG tracking Number	1154
Configuration	Equipped with twelve 10/100 Mbit/s full duplex Ethernet ML-7710 interfaces
Notes	

System C.

Manufacturer	Wavetek Wandel Goltermann
Product	DominoFastEthernet
Model	DA-350

Description	Hardware-based network analyzer
Version	DominoCore version 2.5 　Domino version BN 9316/01 　Domino FE Line Interface 2.5 Patch Level N/A
Release Date (if Beta)	N/A
Serial Number	D-0006
TTG tracking Number	Domino Core: 　3206-152 　Part Number:
Configuration	100Base-TX "Pass-Thru", full duplex
Notes	MAC 00:01:68:72:00:CE

System D.

Manufacturer	3M
Product	Media Converter
Model	VOL-0213
Description	Chassis equipped with 21 RJ-45/VF-45 VOL-0208 media converters
Version	N/A
Release Date (if Beta)	N/A
Serial Number	99500973; 99500971
TTG tracking Number	N/A
Configuration	N/A
Notes	

Detailed System and Platform Configuration

System	E	SmartBits and Domino Console
Platform	Manufacturer	IBM Clone
	Model	N/A
	CPU 1	Intel Pentium Processor
	CPU 1 Speed	200 MHz
	CPU 2	
	CPU 2 Speed	
	CPU 3	
	CPU 3 Speed	
	CPU 4	
	CPU 4 Speed	
	Memory	32 M/Bytes
	Bus 1	Card Bus (PCI)
	Bus 2	
	Fixed Disk Size	2.1 G/Bytes
Network	Manufacturer	IBM
Adapter	Model	EtherJet 10/100 Management
1	Bus	PCI
	Topology	Ethernet
	Driver	3.1
Network	Manufacturer	
Adapter	Model	

2	Bus	
	Topology	
	Driver	
OS	Manufacturer	Microsoft Corp.
	OS	Windows NT Workstation
	Version	4.0 SP5
Config-uration	Relevant Information	
Notes		

System	F - H	Chariot Console and Endpoint Clients
Platform	Manufacturer	AMD
	Model	K62
	CPU 1	AMD Processor
	CPU 1 Speed	400 MHz
	CPU 2	
	CPU 2 Speed	
	CPU 3	
	CPU 3 Speed	
	CPU 4	
	CPU 4 Speed	
	Memory	64 M/Bytes
	Bus 1	Card Bus (PCI)
	Bus 2	
	Fixed Disk Size	6.0 G/Bytes
Network	Manufacturer	3M
Adapter	Model	N100VF
1	Bus	PCI
	Topology	Fast Ethernet
	Driver	2.21
Network	Manufacturer	
Adapter	Model	
2	Bus	
	Topology	
	Driver	
OS	Manufacturer	Microsoft Corp.
	OS	Windows NT Workstation
	Version	4.0 SP5
Config-uration	Relevant Information	
Notes		

System	I – K	Endpoints Clients
Platform	Manufacturer	IBM Clone
	Model	N/A

	CPU 1	Intel Pentium Processor
	CPU 1 Speed	200 MHz
	CPU 2	
	CPU 2 Speed	
	CPU 3	
	CPU 3 Speed	
	CPU 4	
	CPU 4 Speed	
	Memory	32 M/Bytes
	Bus 1	Card Bus (PCI)
	Bus 2	
	Fixed Disk Size	2.1 G/Bytes
Network Adapter 1	Manufacturer	3M
	Model	N100VF
	Bus	PCI
	Topology	Fast Ethernet
	Driver	2.21
Network Adapter 2	Manufacturer	
	Model	
	Bus	
	Topology	
	Driver	
OS	Manufacturer	Microsoft Corp.
	OS	Windows NT Workstation
	Version	4.0 SP5
Config-uration	Relevant Information	
Notes		

Detailed Test Results

Test Name	Full Mesh Fast Ethernet Zero-Loss Throughput (32 ports)
Test Date(s)	30 – 31 March 2000
Test Results: Special notes/considerations	

Test Results: Fast Ethernet Throughput

3M Volition 4000 - 64 Bytes - 32 Ports - Zero Loss Throughput Test Results					
Iterations	Offered Load	Transmitted Frames	Received Frames	Lost Packets	Percent Loss
#1	100%	285,714,272	285,714,272	0	0.00000%
#2	100%	285,714,272	285,714,272	0	0.00000%
#3	100%	285,714,272	285,714,272	0	0.00000%
Average	100%	285,714,272	285,714,272	0	0.00000%

3M Volition 4000 - 512 Bytes - 32 Ports - Zero Loss Throughput Test Results					
Iterations	Offered Load	Transmitted Frames	Received Frames	Lost Packets	Percent Loss
#1	100%	45,112,768	45,112,563	205	0.00000%
#2	100%	45,112,768	45,112,530	238	0.00000%
#3	100%	45,112,768	45,112,581	187	0.00000%
Average	100%	45,112,768	45,112,558	210	0.00000%

3M Volition 4000 - 1518 Bytes - 32 Ports - Zero Loss Throughput Test Results					
Iterations	Offered Load	Transmitted Frames	Received Frames	Lost Packets	Percent Loss
#1	100%	15,604,672	15,604,661	11	0.00000%
#2	100%	15,604,672	15,604,669	3	0.00000%
#3	100%	15,604,672	15,604,652	20	0.00000%
Average	100%	15,604,672	15,604,661	11	0.00000%

Test Results: Fast Ethernet Latency

3M Volition 4000 - 64 Byte- 32 Ports - 100 Mbit/s Full Duplex- Latency Test Results- (FIFO)								
Average in	Port 1-2	Port 3-4	Port 5-6	Port 7-8	Port 9-10	Port 11-12	Port 13-14	Port 15-16	Percentag
micro-	8.97	8.87	8.93	8.97	8.90	8.87	8.87	8.87	of Offered
seconds	Port 17-18	Port 19-20	Port 21-22	Port 23-24	Port 25-26	Port 27-28	Port 29-30	Port 31-32	Load 1.(
9.4 (us)	9.00	8.93	12.43	9.03	9.07	12.23	8.83	(%)

3M Volition 4000 - 512 Byte- 32 Ports - 100 Mbit/s Full Duplex- Latency Test Results- (FIFO)								
Average in	Port 1-2	Port 3-4	Port 5-6	Port 7-8	Port 9-10	Port 11-12	Port 13-14	Port 15-16	Percentag
micro-	44.77	44.70	44.80	44.87	44.73	44.80	44.67	44.73	of Offered
seconds	Port 17-18	Port 19-20	Port 21-22	Port 23-24	Port 25-26	Port 27-28	Port 29-30	Port 31-32	Load 1.(
45.6 (us)	44.77	44.80	51.37	44.83	44.87	44.80	51.23	44.77	(%)

3M Volition 4000 -1518 Byte- 32 Ports - 100 Mbit/s Full Duplex- Latency Test Results- (FIFO)								
Average in	Port 1-2	Port 3-4	Port 5-6	Port 7-8	Port 9-10	Port 11-12	Port 13-14	Port 15-16	Percentag
micro-	125.40	125.33	125.37	125.43	125.43	125.50	125.37	125.57	of Offered
seconds	Port 17-18	Port 19-20	Port 21-22	Port 23-24	Port 25-26	Port 27-28	Port 29-30	Port 31-32	Load 1.(
127.1 (us)	125.47	125.40	139.07	125.53	125.47	125.53	139.03	125.40	(%)

Test Results: Head-of-Line Blocking

3M Volition 4000 - 1518-Bytes - 4 Ports -100 Mbit/s Half Duplex - Head-of-Line Blocking Test Results	
Iteration	Uncongested Port (Percent Loss)
#1	0%
#2	0%
#3	0%

Test Results: Chariot Throughput Results

3M Volition 4000 - 100 Mbit/s Full Duplex - File Send Long Bi-directional Traffic - Chariot Aggregate Throughput Test Results	
Iteration	Throughput (Mbit/s)
#1	183.601
#2	183.623
#3	183.624
Average	183.616

<u>Project Administration Information</u>

General Project Information:

Project Name	3M VOL-4000 Fast Ethernet Switch and 3M N100VF Fast Ethernet Adapter Benchmark Performance Evaluation
Project Objective	Benchmark throughput of VF-45 adapters and VF-45 Fast Ethernet switch.
Project Sponsor	3M
Project File Number	TG00-005
Project Code Name	Meese 5
Project Start Date	30 March 2000
Project Finish Date	TBD
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<u>Appendix A: Chariot Script</u>

```
          CHARIOT, BY GANYMEDE SOFTWARE INC.


SUMMARY - C:\GANYMEDE\CHARIOT\TESTS\3M\ME5TR01A.TST

Console version      3.1
Console build level  523
Console product type Chariot
Filename             C:\Ganymede\Chariot\Tests\3M\me5tr01a.tst
Run start time       Thursday, March 30, 2000, 5:00:14 PM
Run end time         Thursday, March 30, 2000, 5:03:14 PM
Elapsed time         00:03:00
How the test ended   Ran to completion
Number of pairs      10


RUN OPTIONS

End type                                   Run for a fixed
duration
Duration                                   00:03:00
Reporting type                             Batch
Automatically poll endpoints               No
Stop run upon initialization failure       Yes
Connect timeout during test (minutes)      0
Stop test after this many running pairs fail  1
Collect endpoint CPU utilization           No
Validate data upon receipt                 No
Use a new seed for random variables on every run Yes
_____
_____


GROUP: ALL PAIRS / PAIR: 1

Endpoint 1           200.100.50.10
Endpoint 2           200.100.50.1
Network Protocol     TCP
Service Quality
Script Name          filesndl.scr
Pair Comment
Console Knows Endpoint 1 200.100.50.10
Console Protocol     TCP
Console Service Quality  n/a


Script
filesndl.scr, version 3.1 -- File Send, Long Connection

Endpoint 1                      Endpoint 2
---------------------------- --------------------------------
SLEEP
  initial_delay=0
```

```
CONNECT_INITIATE                  CONNECT_ACCEPT
  port_number=AUTO                  port_number=AUTO
LOOP                              LOOP
  number_of_timing_records=100      number_of_timing_records=100
  START_TIMER
  LOOP                              LOOP
    transactions_per_record=1         transactions_per_record=1
    SEND                              RECEIVE
      file_size=1000000                 file_size=1000000
      send_buffer_size=DEFAULT          receive_buffer_size=DEFAULT
      send_datatype=NOCOMPRESS
      send_data_rate=UNLIMITED
    CONFIRM_REQUEST                   CONFIRM_ACKNOWLEDGE
    INCREMENT_TRANSACTION
  END_LOOP                          END_LOOP
  END_TIMER
  SLEEP
    transaction_delay=0
END_LOOP                          END_LOOP
DISCONNECT                        DISCONNECT



Variable Name                Value Description
----------------------- ---------- ----------------------------------
---
initial_delay                    0 Pause before the first transaction
number_of_timing_records       100 How many timing records to generate
transactions_per_record          1 Transactions per timing record
file_size                  1000000 How many bytes in the transferred
file
send_buffer_size           DEFAULT How many bytes of data in each SEND
receive_buffer_size        DEFAULT How many bytes of data in each
RECEIVE
transaction_delay                0 Milliseconds to pause
send_datatype           NOCOMPRESS What type of data to send
send_data_rate           UNLIMITED How fast to send data
port_number                   AUTO What port to use between endpoints
```
_____
_____