



#212114
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Commissioned by
Fluke Networks

Fluke Networks - Network Time Machine™ Premium Series 20 Gbps Stream-to-Disk Capture Performance Evaluation

EXECUTIVE SUMMARY

With 10 Gigabit Ethernet (10GbE) links becoming the norm for data center backbones, the amount of data that can flow across the core can increase by an order of magnitude over existing Gigabit implementations. In fact, a fully-loaded 10GbE network can generate over a terabyte of data bi-directionally every seven minutes.

Fluke commissioned Tolly to evaluate the performance of its Network Time Machine™ (NTM) network capture and application analysis appliance. Specifically, tests were focused on illustrating 100% sustained data capture at full-duplex, 10 Gbps data rates - or 20 Gbps.

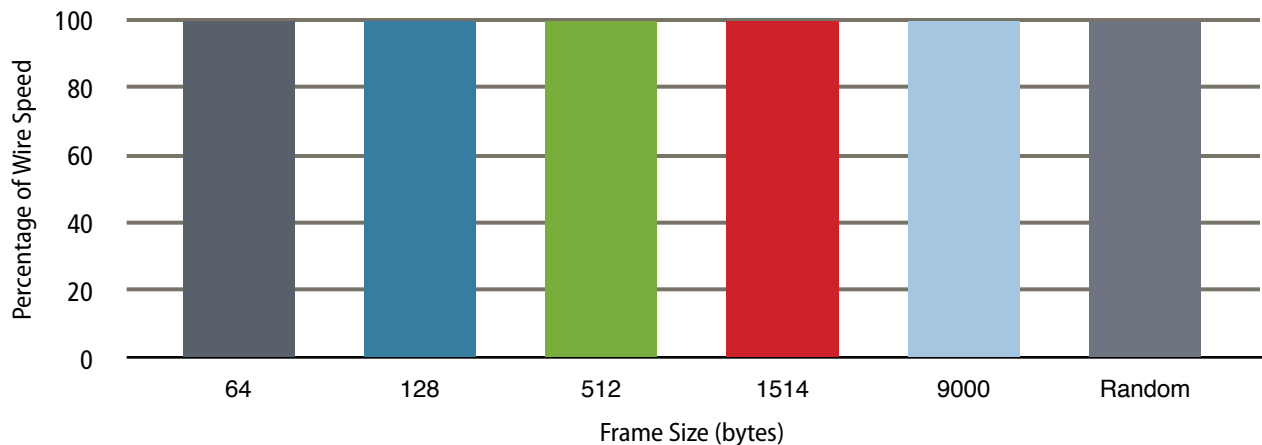
Tests showed that the Network Time Machine captured traffic at 20 Gbps without loss for all frame sizes tested from 64-byte to 9000-byte "jumbo frames". See Figure 1. Additional tests, run for multiple hours, illustrated that the NTM could collect data continuously hour after hour.

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THE BOTTOM LINE

- 1 Demonstrated sustainable 20 Gbps loss-free stream-to-disk capture performance with streams of various frame sizes
- 2 Provides integrated, comprehensive retrieval and analysis of traffic found in data and multimedia applications
- 3 Demonstrated design that provides scalable data capture capacity up to hundreds of terabytes
- 4 Workflow for troubleshooting network and application performance problems from high level statistical view to detailed packet analysis

Network Time Machine: Loss-Free, Sustained Network Traffic Capture Rates of Two 10Gbps Ethernet Streams



Notes: Test of random frame sizes ranged from 64 to 9000 bytes. 5 minute runs. All data written to disk without loss. Network Time Machine adds 16 bytes to each frame before writing to storage. A 2.5 hour test of 64-byte frames was run to demonstrate long-term, loss-free stream-to-disk operation.

Source: Tolly, April 2012

Figure 1



Lossless Capture Performance

The Network Time Machine by Fluke Networks is an all-in-one capture appliance for network and application analysis that is available in rack-mount as well as portable platforms. Tolly tested the rack-mount version outfitted with two 10GbE interfaces and two storage appliances. See Table 2.

As noted above, the testing focused on verifying lossless capture of line-rate traffic up to a total of 20Gbps. Bi-directional 10GbE ports were used to generate the traffic.

Tests were first run using traffic of a single frame size. All test traffic was generated by

an Ixia traffic generation system. Tests illustrated that the NTM could capture all frames when using the smallest frame size supported by Ethernet and, thus, the highest frame rate.


Further tests illustrated that the NTM exhibited lossless capture at a range of frame sizes that included 1514-bytes (near the limit of standard Ethernet) as well as when capturing so-called "jumbo frames" of 9000-bytes. Additionally, tests were run using a random mix of frame sizes between 64-bytes and 9000-bytes. Again, all traffic was captured without loss.

To illustrate the capacity of the NTM to provide lossless capture/stream-to-disk for extended periods, Tolly engineers re-ran the test of 64-byte frames with a run-time

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Network Time Machine Premium Series

20Gbps Stream-to-Disk Performance



Tested April 2012

of 2.5 hours. Again, the NTM provided lossless capture of all frames.

Table 1 summarizes the key elements of the individual test scenarios.

Fluke Network Time Machine: Network Traffic Capture/Write Data
Two Streams of 10 Gigabit Ethernet Network Traffic

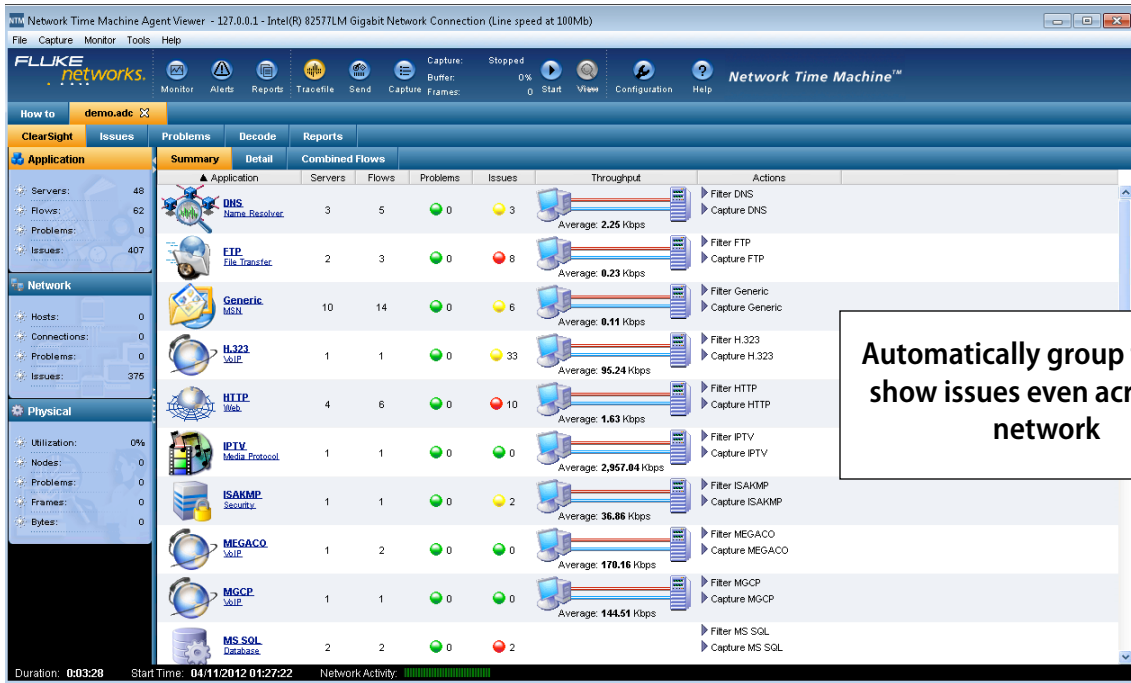
Network Statistics		Network Time Machine Appliance Statistics	
Frame Size (bytes) ¹	Traffic Generator Transmit Load Setting (% Utilization)	Record/Frame Size Written to Disk (bytes) ²	Disk Write Rate (GBps) ⁴
64	100	80	2.217
128	100	144	2.265
512	100	528	2.291
1514	100	1,530	2.322
9000	100	9,016	2.327
Random (ranging from 64 to 9000 bytes)	100	4,548 ³	2.325

Note: 1. Frame size as generated by the Ixia traffic generator. 2. The NTM adds 16-bytes to the frame size in column 1 and this value, shown in column 3, is used when calculating the disk write rate. 3. Frame size values were averaged. 4. Disk write rate could exceed 20 Gbps because of the tag, referenced in note 2, added to each frame during the write to disk by NTM.

Source: Tolly, April 2012

Table 1

Application Centric Analysis



Automatically group flows to show issues even across the network

Performance Bottleneck Analysis



Answer the question: Is the performance problem linked to the server, the network or the client?

Source: Fluke Networks, April 2012

Figure 2



Network & Application Analysis

While no formal test plan was used for this portion of the test, Tolly engineers worked with the NTM to evaluate its GUI and network and application analysis capabilities using traffic captured separately from a sample network.

The NTM is complemented by the powerful protocol analysis of the ClearSight Analyzer, which provides administrators access to a wealth of network information across all seven OSI layers. In addition to providing a picture of Layer 2/3 endpoints and conversations on the network, ClearSight groups traffic by 30+ application types and will perform actionable analysis on each application, detecting problems and providing data such as average throughput, response times and data volume, among many other application-specific metrics. See Figure 2.

ClearSight is capable of reconstructing stateful application traffic such as FTP, HTTP and popular email, VoIP, and video protocols. This allows administrators to discover any previously sent data as well as to replay entire VoIP and video sessions, all from within the console.

Test Bed Setup & Methodology

The test bed consisted of the NTM device under test connected to an Ixia Optixia XM2 traffic generator outfitted with an 8-port 10GbE line card.

Two 10GbE ports were connected to the two 10GbE capture ports on the NTM. Table 2 provides details of the NTM configuration tested. See Figure 3 for additional information about NTM and Figure 4 for a test bed diagram.

Engineers tested Network Time Machine version 9.0.0.42. The system is architected as a controller plus disk arrays for storage. The controller was a Dell PowerEdge R810 with 32GB of RAM and a Fluke Networks

dual-port 10GbE capture card. The disk arrays were implemented as two Dell PowerVault systems each outfitted with 12x2TB SAS 7.2K drives.

Engineers verified that both streams of traffic were captured and reported by the NTM before continuing with the data collection.

Tests of single-size streams set for 100% load were run at 64, 128, 512, 1514 and 9000 bytes. An additional test was run set for random frame sizes, from 64-bytes to 9000-bytes, with an average frame size of ~4500-bytes. Multiple short tests were run for 5 minutes each. A 2.5 hour run was used to validate that the system could run for an extended period with no frame loss and that no traffic buffering took place. At the end of that test, engineers verified that the transmit/receive counts of the traffic generator running at 100% load matched the statistics for frames recorded on the NTM.

Solution Under Test

Device	Description	Quantity	10GbE Ports
Capture Appliance	2U controller with dual RAID Controllers and a Fluke dual-port 10GbE interface	1	2
Storage Appliance	2U storage appliances (12x2TB each)	2	N/A

Source: Tolly, April 2012

Table 2

About Network Time Machine

The Network Time Machine is an all-in-one solution for back-in-time root cause analysis of network and application problems. The innovative Performance Bottleneck Analysis (PBA) visually identifies the fault domain to the server or the network. The onboard application-centric analysis finds problems without needing to look at packets. Advanced data mining quickly pinpoints the relevant packets in multiple terabytes of captured data.

These time-saving analytics are integrated into a single appliance, reducing initial expense, set-up time and ongoing maintenance. NTM's plug-and-play operation automatically identifies applications, analyzes their performance, and displays relevant statistics in user-configurable dashboards.

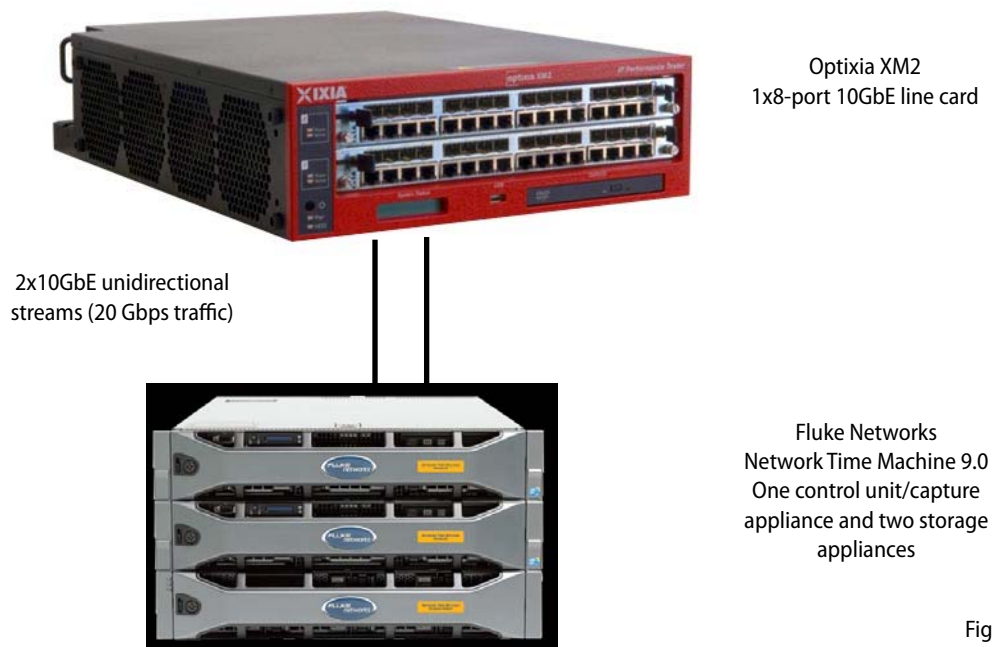
Auto-multisegment analysis supports collaborative packet capture, retrieval and analysis across multiple rack-mount, portable or desktop deployments and reduces time and effort required to analyze tough application issues across multiple segments by a factor of 5 or more.

You won't miss a key event with the NTM's high performance packet capture on multiple 10/100 Mbps, 1 Gbps, 10 Gbps and 40Gbps Ethernet interfaces at rates up to 20Gbps with multiple terabytes of RAID storage.

Source: Fluke Networks, April 2012

Figure 3

20Gbps Stream-to-Disk Test Bed



Source: Tolly, April 2012

Figure 4



About Tolly...


The Tolly Group companies have been delivering world-class IT services for more than 20 years. Tolly is a leading global provider of third-party validation services for vendors of IT products, components and services.

You can reach the company by email at sales@tolly.com, or by telephone at +1 561.391.5610.

Visit Tolly on the Internet at: <http://www.tolly.com>

Test Equipment Summary

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

Vendor	Product	Web
ixia	Optixia XM2 1x 8-port 10GbE line card IxExplorer 6.10.750.24 GA Patch-1	 http://www.ixiacom.com

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