TEST REPORT

Tolly.

#211102
March 2011
Commissioned by
Network Instruments, LLC

Network Instruments® GigaStor™ 10 Gb Wire Speed

10 Gigabit Ethernet Capture Performance Evaluation

Executive Summary

The price and performance benefits of 10 Gigabit Ethernet (10GbE) have accelerated its use in enterprise and service provider networks. With it, though, 10GbE brings a torrent of traffic that can overwhelm a typical network trace tool in seconds. In fact, a fully-loaded 10GbE network can generate over a terabyte of data bi-directionally every seven minutes.

Network Instruments commissioned Tolly to evaluate the performance of its GigaStor 10 Gb Wire Speed network data recorder. Specifically, tests were focused on illustrating 100% sustained data capture at full-duplex, 10 Gbps data rates.

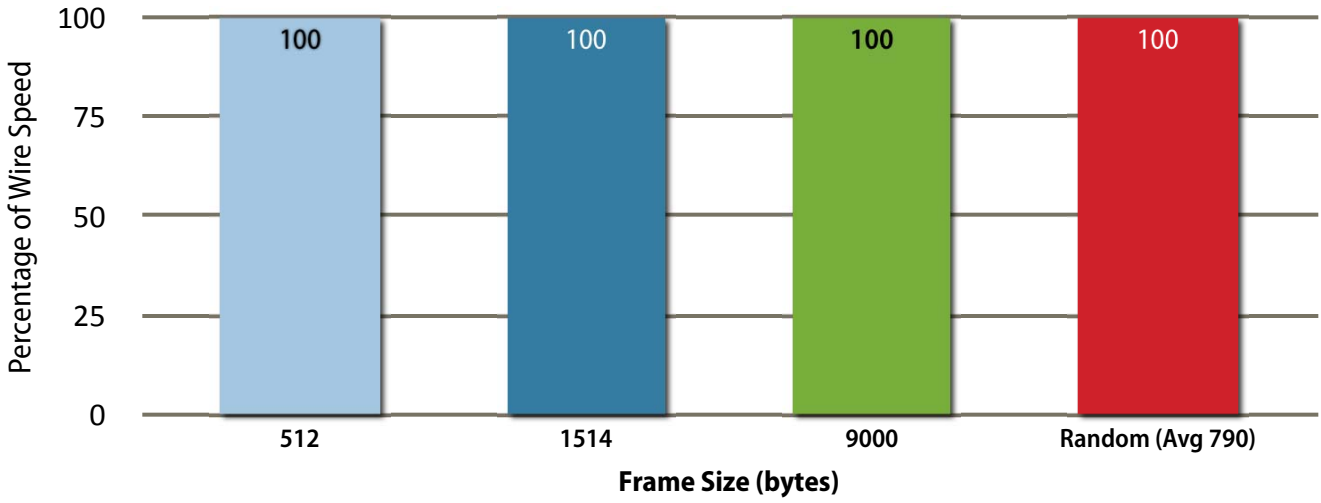
Tests showed that the GigaStor 10 Gb Wire Speed captured line-rate, bi-directional 10GbE network traffic with zero frame loss in a number of frame-size scenarios and could sustain this capture rate for multiple hours resulting in data collection levels in the hundreds of terabytes. See Figure 1.

Test Highlights

The GigaStor 10 Gb Wire Speed:

1. Demonstrated line-rate, bi-directional, loss-free capture of 10GbE traffic in real time
2. Provided comprehensive post-event access to network data
3. Demonstrated scalable data capture to levels of hundreds of terabytes
4. Supported multiple packet size streams typically encountered in the enterprise data center

GigaStor 10 Gb Wire Speed: Loss-Free, Sustained Network Traffic Capture Rates of Bi-Directional, Wire-speed 10 Gigabit Ethernet Streams



Source: Tolly, January 2011

Figure 1

Introduction

LANs are already two orders of magnitude faster than the 100 Mbps "Fast Ethernet" networks introduced in the 1990s. Even with 100 times more data flowing across today's networks, the need to be able to capture every bit that traverses the network is greater today than in the past.

Whether analyzing network anomalies, documenting data leaks or investigating other security breaches there are times when network managers will need to be able to capture every bit so that later they can effectively "rewind" and analyze vast amounts of network data.

Network Instruments has introduced the GigaStor 10 Gb Wire Speed network data recorder appliance to meet this need.

The appliance is powered by Microsoft Windows Server 2008 and, importantly, Network Instruments' proprietary, high-performance, 10GbE data capture network interface card (NIC) capable of capturing a full 20 Gbps of wire speed traffic, writing to disk at up to 2.68 GBps (21,440 Mbps).

The appliance tested consisted of four units. The "head end" unit contained the NIC, Windows software and 24 bays each holding a 2TB disk. Each of the three remaining enclosures connected to the main unit and contained 24 2TB disks. While the GigaStor 10 Gb Wire Speed system supports 192 TB of disk space, Network Instruments notes that their current GigaStor maximum capacity is more than half a petabyte of storage.

Network Instruments

GigaStor 10 Gb Wire Speed

10 GbE Capture Performance

Tested January 2011

Test Results

Data Capture

Tolly engineers connected the GigaStor appliance to a traffic source that generated wire-speed traffic across a 10GbE network port. That traffic was fed into a network tap to produce two, separate streams of wire-speed traffic. This simulated capturing all traffic on a bi-directional (full duplex) 10GbE network port.

The GigaStor successfully captured every frame traversing the network on a sustained basis when the network was running at 100% line rate. The tests were conducted using a variety of frame sizes from 512 to 9000 bytes as well as a mix of random sizes. Table 1 provides a snapshot of the measurements and the traffic rates captured. Figure 2 provides a view of the GigaStor control panel summary screen.

GigaStor 10 Gb Wire Speed: Network Traffic Capture/Write Data
Bi-Directional, Wire-speed 10 Gigabit Ethernet Network Traffic

Network Statistics		GigaStor 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]
512	100	568	21.19
1514	100	1570	20.39
9000	100	9056	20.07
Random (790 avg)	100	846.056 [3]	20.85

Note: 1. Frame size as generated by SmartBits traffic generator. 2. The GigaStor adds 56-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 GigaStor.

Source: Tolly, January 2011

Table 1

Test Bed Setup & Methodology

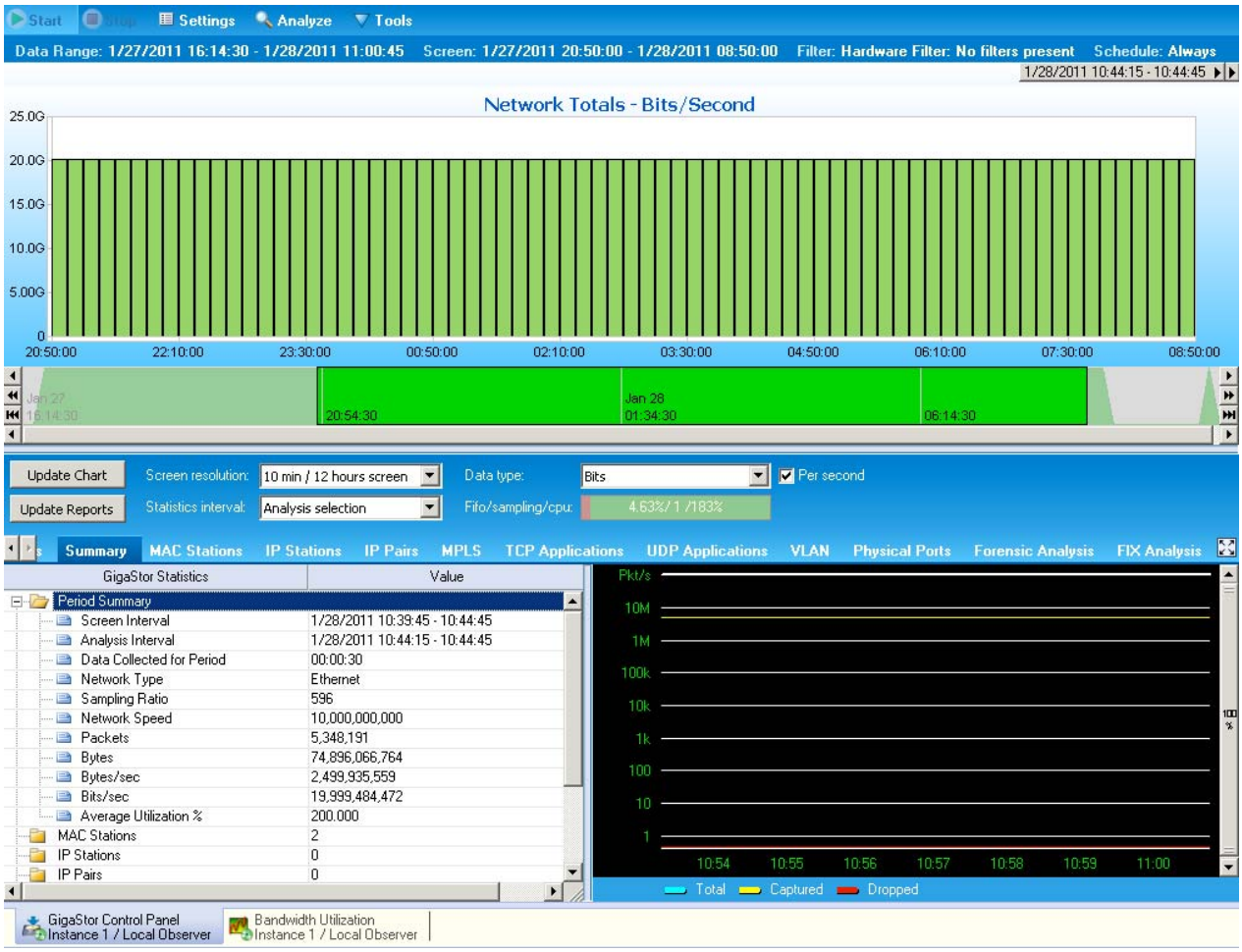
The test bed consisted of the GigaStor device under test connected to a Spirent SMB600B traffic generator outfitted with a single SmartMetrics 10GbE XFP line card.

The single Spirent 10GbE port was connected to a three-port Network Instruments optical tap to generate two separate streams, totaling 20 Gbps, that were then connected to the two 10GbE capture ports on the GigaStor. Table 2 provides details of the GigaStor configuration tested and Figure 3 provides a diagram of the test environment.

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

Tests of single-size streams set for 100% load were run at 512, 1514 and 9000 bytes. An additional test was run (set for random frame sizes) with an average frame size of 790 bytes. Multiple short tests were run for 2-3 minutes, assuring no frame loss, with 15 second data capture intervals, to provide manageable samples for calculations. A two-hour run was used to validate that the system could run for an extended period with no frame loss. 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 GigaStor.

GigaStor 10 Gb Wire Speed: Control Panel
Sample Summary Screen Showing Sustained 20 Gbps Over Many Hours



Source: Tolly, January 2011

Figure 2

About the GigaStor 10 Gb Wire Speed

The GigaStor 10 Gb Wire Speed is part of the GigaStor product family. Because resolving network and application issues often requires every packet, all GigaStor solutions incorporate custom-designed hardware and software to deliver the optimal packet capture performance to meet your specific business requirements.

The process begins with a Network Instruments-designed Gen2™ capture card that's able to successfully record every conversation traversing the network. Next, the high-speed architecture, utilizing the latest motherboard, memory, and PCI-Express technologies, writes all data to disk for long-term storage.

Housing all this technology is a highly fault tolerant, internally developed 5U chassis that is designed for cooling, redundancy, mechanical rigidity, and rack efficiency. Integrated with this hardware is intelligence that is able to filter, de-duplicate, and structure the data for optimal write and post-event analysis without losing a single packet.

GigaStor is available in portable and rack models that scale from 8 TB to 576 TB, as well as write to SAN for nearly unlimited storage.

Network Instruments Gen2 Capture Card

Source: Network Instruments, January 2011

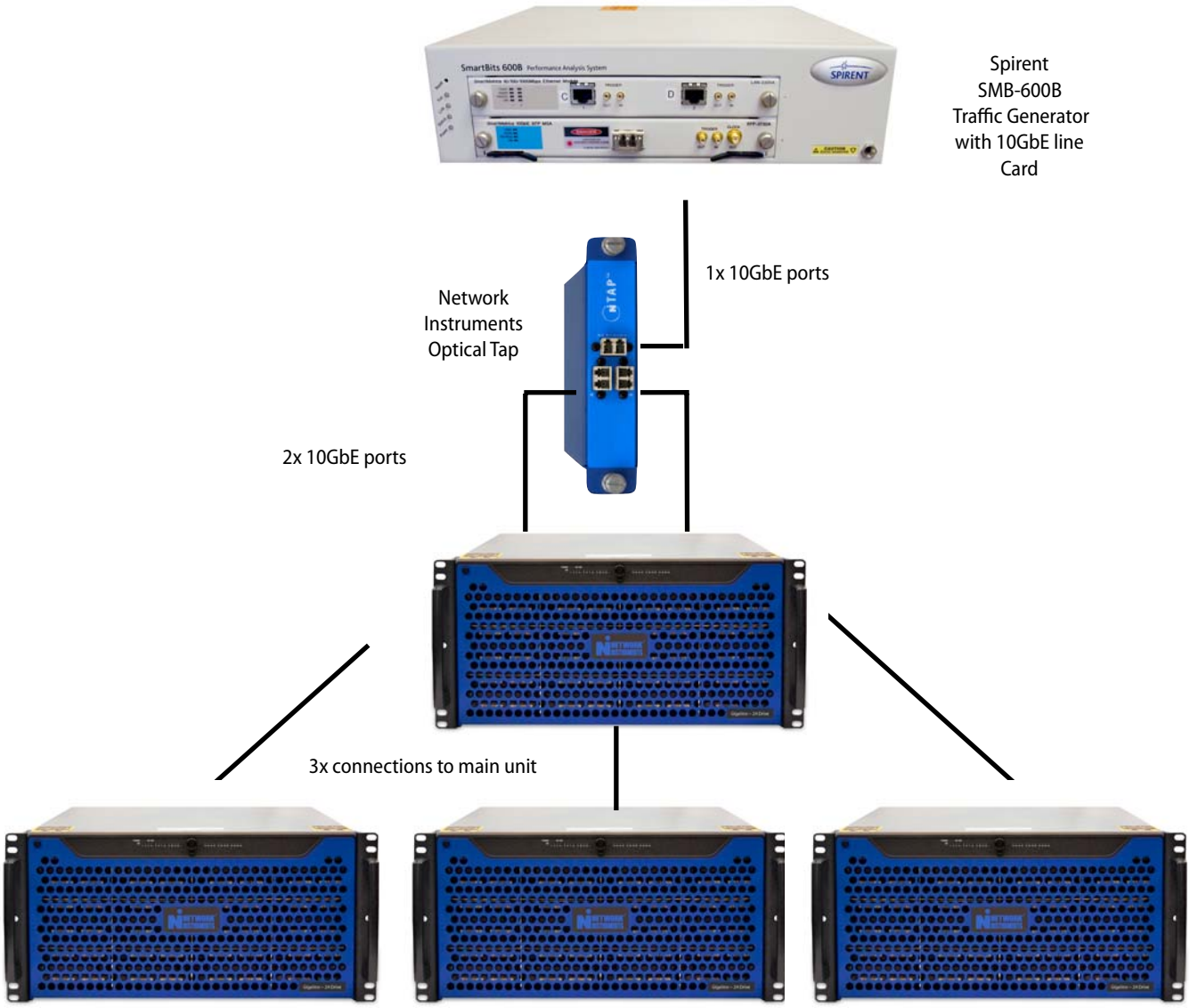
Solution Under Test

Device	Description	Quantity	Disk Quantity/ Size	10GbE Ports
GigaStor 10 Gb Wire Speed	Head Unit	1	24/2TB	2
GigaStor 10 Gb Wire Speed	Disk Units (JBoD)	3	24/2TB	0

Note: The configuration tested had 192 TB of disk. The head (main) unit contained a server system and the Network Instruments data capture interfaces. The main unit was connected to the three lower units and these provided additional storage capacity.

Source: Tolly, January 2011 Table 2

10GbE Capture Performance Test Bed



Note: The configuration tested had 192 TB of disk. The head unit contained a server system and the Network Instruments data capture cards. The main unit was connected to the three lower units and these provided additional storage capacity.

Source: Tolly, January 2011

Figure 3

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.

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