TEST REPORT

Tolly.

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Commissioned by
Anue Systems, Inc.

Anue 5236 Net Tool Optimizer

Performance, Feature, and Usability Evaluation

Premise

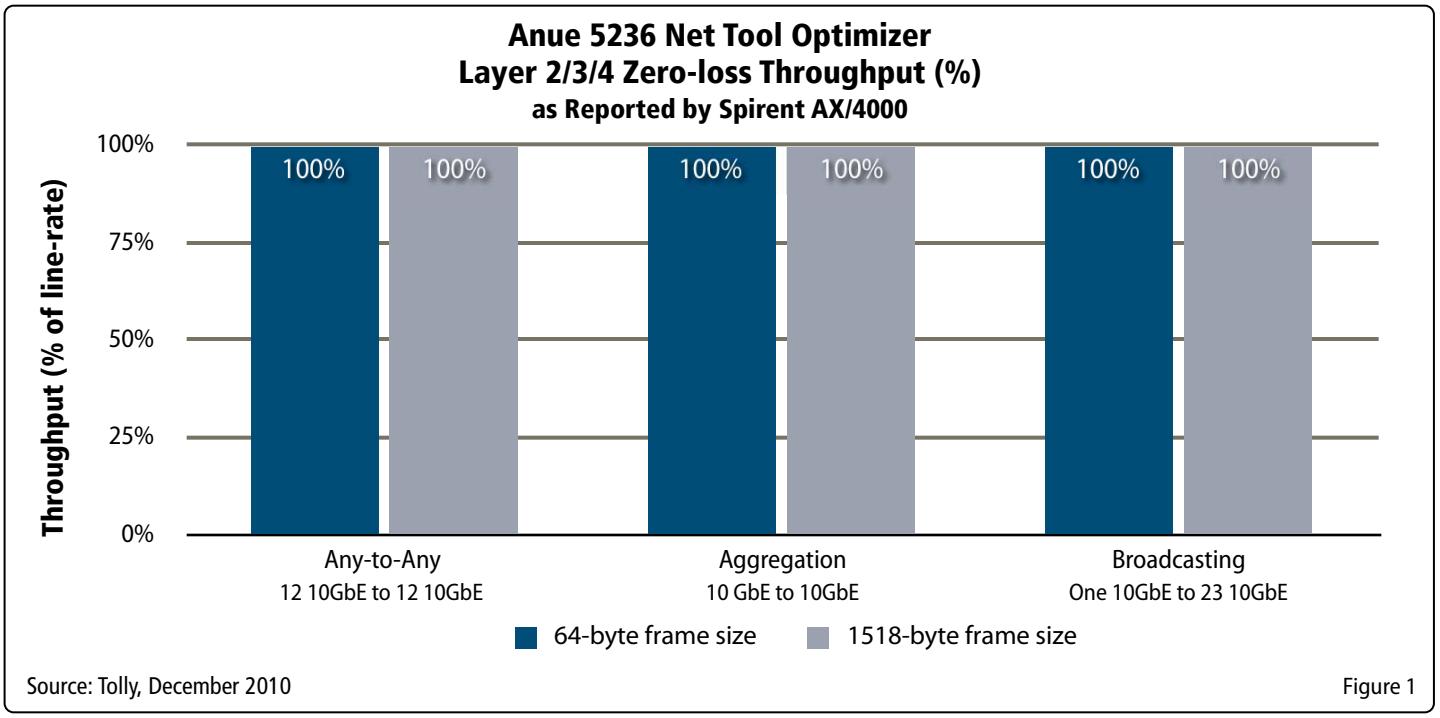
IT teams are increasingly asked to deliver more robust, dynamic, and higher performing networks on flat or shrinking IT budgets. They often deploy a large, heterogeneous mix of monitoring tools to help them ensure their networks are running smoothly including IDS/IPS, sniffers, packet analyzers and data recorders. These tools can cost tens or hundreds of thousands of dollars, yet are often poorly utilized; each tool requiring a dedicated stream of traffic to monitor the network effectively. Even if an engineer does gain approval to purchase one of these tools, the number of switched port analyzer (SPAN) ports available for connecting the tool are often very limited and already overcommitted.

Anue's Net Tool Optimizer family directly addresses these problems by introducing a cost-effective, strategic solution to increase network tool utilization dramatically with minimal cost. Such tools can decrease IT costs, help reduce network outages, boost network performance, and increase the overall productivity of the IT team.

Test Highlights

The Anue 5236 Net Tool Optimizer provides:

1. Line-rate performance up to 244 Gbps with zero dropped packets when aggregating, multicasting, and filtering network traffic
2. Zero-loss performance when aggregating and filtering (Layer 2, 3, and 4) traffic from up to 23 10GbE network ports to a single 10GbE tool port
3. 100% accuracy in broadcasting overlapping filtered traffic from one network port to 1+ tool ports without having to identify overlaps or program complex filter rules
4. An intuitive management interface, allowing users to configure and customize filtered streams for diagnosis in a matter of minutes



Source: Tolly, December 2010

Figure 1

Executive Summary

Anue Systems, Inc. commissioned Tolly to evaluate the performance and features of the Net Tool Optimizer 5236, a 28-port network visibility system providing up to 24 10GbE and 4 GbE connections that is capable of filtering traffic at layers 2, 3, and 4.

The Net Tool Optimizer (NTO) 5236 delivers 100% accuracy and line-rate performance when filtering, aggregating and broadcasting traffic from SPAN and tap ports to tool ports.

According to Anue: "The Net Tool Optimizer resides in between network connections and monitoring tools to aggregate, filter, and replicate traffic to their respective destinations thereby increasing the efficiency of existing tap and SPAN infrastructure. This network visibility system allows engineers to connect monitoring tools to multiple points on the network simultaneously and increase productivity of expensive monitoring tools. In order to achieve "always on" network connectivity, data center managers oversee a large number of appliances that monitor security, performance and availability for both networks and applications. The Net Tool Optimizer 5236 ensures that priority traffic is always delivered to essential monitoring tools."

The NTO saves time and eliminates repetitive — and sometimes tedious — configuration tasks associated with creating network traffic filters. Centralized filter templates allow users to create common filtering scenarios which can then be applied quickly, as needed, to the monitoring environment. Standalone or nested filters can be implemented at either the ingress or egress port, as well as within the Anue 5236.

Testing showed that the Anue 5236 was able to filter all ingress data and direct the desired traffic (e.g. by address, VLAN or protocol) to designated tool ports for troubleshooting or analysis. See Table 1 for a summary of Anue packet-level filtering capabilities.

The dynamic architecture of the filters ensures that only the traffic of interest is delivered to one or more tool ports. Irrelevant packets are dropped immediately at the ingress port thus optimizing bandwidth available for subsequent stages of processing. This filtering capability is critical in maximizing the coverage, accuracy, and utilization of network tools by preventing tools from being overloaded with non-critical data, a common and undesirable occurrence in many data centers.

Tolly engineers verified that the Anue 5236 delivered zero-loss, line-rate throughput across the two frame sizes tested. See Figure 1.

In addition, engineers benchmarked the latency of the Anue 5236 when passing bursty traffic on both 10GbE and 1GbE links. The architecture of Anue allows for <4 µsec of latency when passing both 64 and 1518-byte packets at 10Gbps. See Table 2.

Anue Systems, Inc.

5236 Net Tool Optimizer

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Anue attributes the performance of the Anue 5236 to the company's proprietary Multi-Stream Switching (MSS) technology, which combines a broad range of connectivity options with powerful packet filtering capabilities, such that each tool port receives only the data it needs.

The Anue 5236 allows multiple tools to share access to any network data and can balance loads among multiple tools. The easy-to-use system aggregates network data from any SPAN port or tap in the data center to a convenient, centralized tool farm.

Anue 5200 Family: Packet-Level Filtering Capabilities

Filter Location	Ingress Port	Dynamic Filter	Egress Port
Filter Options	Admit / Deny	Admit	Admit / Deny
Popular Filter Criterion	L2/L3/L4	L2 / L3 / L4	L2 or L3/L4
	MAC*	MAC*	MAC*
	VLAN	VLAN	VLAN
	Port*	Port*	Port*
	IP Address*	IP Address*	IP Address*
*Filtering by source and/or destination			

Note: The Anue 5200 series supports a maximum of 4,200 active ingress/dynamic/egress filters. The filters at the port level allow users the option drop (deny) traffic which can simplify the filtering process as traffic enters or leaves the system.
Source: Tolly, December 2010 Table 1

Test Results

Throughput

The Anue 5236 delivered 100% line-rate throughput on all Gigabit Ethernet and 10Gigabit Ethernet ports handling layer 2 and layer 3 traffic when tested using the Spirent AX/4000 traffic generator. The AX/4000 was configured to generate 64 and 1518-byte packets with the ports configured in like-speed pairs.

Filtering and Aggregation

As noted previously, the Anue manages traffic at multiple points in the data flow - at the ingress/egress ports as well as internally at the dynamic filter level - thus allowing users to implement and manage complex filters easily through the management GUI.

Tolly engineers verified that the Anue 5236 was able to filter traffic at ingress/egress ports and through its dynamic filter capability. See Table 1 for details.

Port-Level Filtering

The port-level filtering capabilities of the Anue family provide a method for directing traffic at a port level while also filtering the traffic to select only packets with specific characteristics.

Tolly engineers verified that ingress network ports could be mapped to one or more egress tool ports in the following ways: any-to any, many-to-any and any-to-many.

In the any-to-any combination, Tolly engineers used a system configuration that caused the data received on a given port to be replicated on a single tool port and verified that input and output data were the same.

In the many-to-any combination, Tolly engineers configured the systems so that specific data received on multiple network ports was aggregated on a single tool port and verified that all the traffic streams from the network ports appeared on the tool port.

In the any-to-many combination, Tolly engineers configured the systems such that specific data received on a single ingress port be replicated on multiple tool ports, and verified that the desired traffic stream was replicated on all the tool ports.

Anue 5236: Average Device Latency with Ingress, Dynamic, and Egress Filtering Active (µsec)

	64 Bytes	512 Bytes	1518 Bytes
10GbE to 10GbE	2.59	2.91	3.67
GbE to GbE	3.6	7.2	15.2

Source: Tolly, December 2010 Table 2

Dynamic Filtering

Dynamic filtering allows users to create custom filters that can select traffic based on combinations defined by the user.

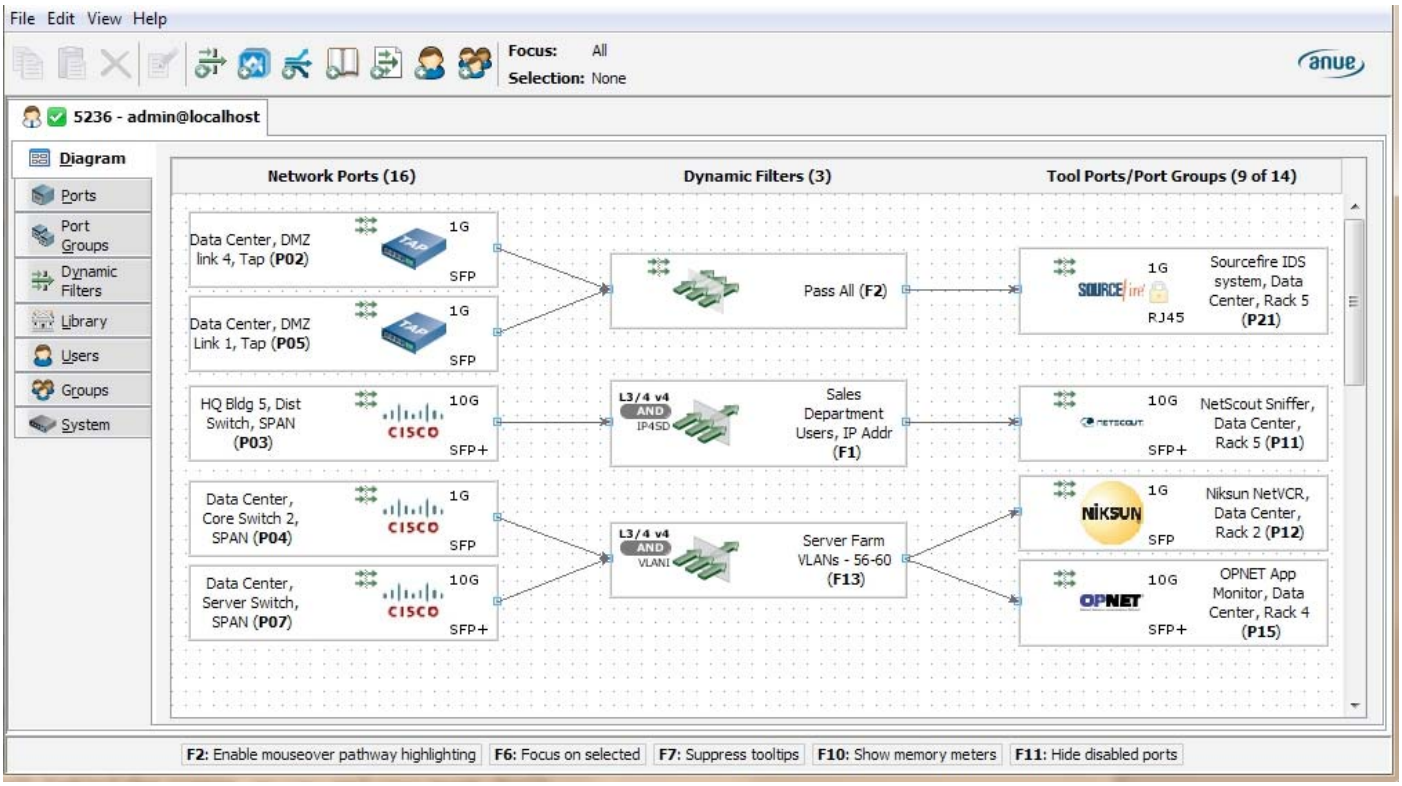
The Anue 5236 provides for easy selection of filtering criteria by layer 2, 3 and 4 protocol fields. Additionally, the "bit-mask" options allow network engineers to select any bits of interest in the packet to use as a basis for filtering.

Anue 5236 Layer 2/3/4 Data Filtering

Filter	Expected % of Traffic	Actual % of Traffic received	Filtered packets received (%)
IP address	5	5	100
VLAN	7	7	100
IP protocol	9	9	100
TCP destination port	11	11	100
VLAN + TCP destination	13	13	100
Overlapping rules	15	15	100
Overlapping rules	15	15	100

Source: Tolly, December 2010 Table 3

Anue Net Tool Optimizer 3.0.3.6 Graphical User Interface



Source: Tolly, December 2010

Figure 2

Overlapping Filter Rules

While a simple, single filter might suffice for certain needs, it is more likely that network engineers will be required to intercept a more refined subset of network traffic. For example, it might be necessary to capture only HTTP traffic on a particular VLAN and, further, direct subsets of that traffic to separate tool ports - one looking at HTTP traffic and the other port looking at traffic on a specific VLAN. Engineers verified that the same traffic on the network port was filtered through overlapping filter rules and appropriately forwarded to the correct tool port as per the filtering criteria.

Filtering Accuracy

As shown in Table 3, the Anue 5236 was able to filter all the traffic accurately as per the criteria specified in the filtering rule(s) - even in the case of overlapping rules.

Latency

Low latency infrastructure is a necessity when dealing with any time-sensitive information. Tests showed that despite being processed by ingress, dynamic, and egress filters simultaneously, the latency for traffic from one 10GbE port to another 10GbE port was in single digits -- less than 4 µsec. For traffic from one GbE port to another, the latency ranged from 3.6 to 15.2 µsec.

Configuration and Management

The Anue 5236 featured a diverse collection of system management tools and features, unified under a single, intuitive interface. See Figure 2.

Tolly engineers verified that the Anue 5236 could be configured and function as a standard IP-based network device by configuring IP addresses, subnet masks and default gateways.

It is important for network devices to be able to report their condition to network management systems. Tolly engineers verified that the Anue 5236 implemented SNMP support and accurately reported state change information via SNMP.

Additionally, engineers confirmed that the Anue 5236 successfully reported log information to a configured Syslog server.

The Anue 5236's graphical control panel provides users a clear view of network port, tool port, and filter settings. The Anue 5236's integration with TACACS+ servers provides user group configuration access. Syslog and

SNMP provide powerful statistics and alarms.

Support for automation scripting allows for proactive monitoring and change control. Likewise, extended statistics and graphing functionality provides increased network visibility.

Ease of Use

The Anue 5236 can be set up quickly providing value to customers in less than 5 minutes. The Anue 5236's graphical control panel provides users a clear view of network port, tool port, and filter settings. This greatly speeds day to day troubleshooting. Additionally, the Anue 5236's powerful statistics, tool pathway views, and alarms provide users with management tools to optimize utilization and coverage of their network tools.

Test Bed Setup

The test bed consisted of three Anue 5236 Net Tool Optimizers connected to a Spirent AX/4000 traffic generator for test traffic generation and validation purposes. (The other Anue devices were used to fan-out traffic to create load for all the ports under test.) All devices were connected to a LAN for management purposes. A PC running Microsoft Windows 7 was connected to the LAN to manage the Anue devices as well as configure the traffic generator using Spirent TestCenter.

Engineers evaluated the Anue 5236 running software version 3.0.3.6, equipped with four GbE ports and 24 10GbE ports.

Test Methodology

Throughput

For this test, the devices were configured as per the test bed diagram, with 12x 10GbE and 2x GbE links on both the ingress and egress. The Spirent AX/4000 was connected to the top 5236 using a single 10GbE link, which was then copied to all fourteen egress ports, into the DUT. The streams were sent through a pass all filter, sending the traffic to the bottom 5236. Engineers then randomly selected one port to be passed back to the AX/4000, and results were recorded.

The test traffic consisted of unidirectional streams of traffic consisting of frames of 64 and 1518-bytes at 100% line-rate (i.e. at 1 Gbps going to the GbE ports on Anue, and at 10Gbps going to the 10GbE ports on the Anue.) The traffic was generated in such a way that 90% of line-rate traffic had an IP of .90, and 10% was .10, such that engineers could apply a pass filter to .10 to load the GbE links at line-rate.

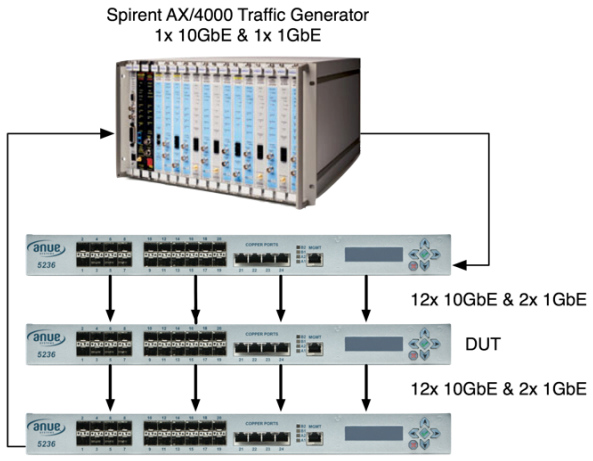
Filter Criteria

To gauge the effectiveness of the 5236's filters, engineers configured a single stream of traffic from the AX/4000 transmit port which consisted of varying combinations of different traffic types, Layers 2 through 4. On the Anue 5236, filters were defined which would select and direct the relevant traffic to individual ports. In addition to verifying the traffic capture on the Anue's statistics window, engineers recombined the separated streams using the bottom 5236, and the traffic was then passed back to the traffic generator's receive port as a further validation of the test results.

Latency

The latency was calculated with test traffic consisting of unidirectional streams of Layer 2 traffic consisting of frames of 64 and 1518-bytes at 100% line-rate for each topology tested. Test traffic was directed back to the AX/4000 and was analyzed to verify that 100% of the traffic transmitted initially was received.

Test Bed Topology



Source: Tolly, December 2010

Figure 3

About Tolly

The Tolly 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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