Lab Test Report

DR110330B

Cisco Nexus 3064

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Miercom

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1.0 Executive Summary

Cisco requested Miercom to conduct an independent third-party performance test of the Cisco Nexus 3064 switch. The testing focused on evaluating the switch with various full load traffic profiles and included measurements of latency, jitter and packet loss with for 64-, 128-, 256-, 512-, 768-, 1024-, 1280-,1516-, 4096- and 9216-byte frames. Typical real world application scenarios of pair unicast, full-mesh multicast, full-mesh unicast and multicast were used in the testing for this report.

In full load traffic conditions, the Cisco Nexus 3064 did not drop packets at 100% capacity and demonstrated consistent results for all port tests. Cisco Nexus 3064 was tested with all common frame sizes.

Different traffic profiles used in testing can produce different performance results. Traffic profiles should include high load characterized traffic for testing of switching products that will be employed in environments, such as financial markets, that will have surges of high volume, but absolutely require consistently low latency. Detailed test results follow and demonstrate the advantages of using the Cisco Nexus 3064 in a network environment that consists of high, dynamic traffic. The tests in this report are intended to be reproducible for customers who wish to recreate them with the appropriate test and measurement equipment.

Current or prospective customers interesting in repeating these results may contact reviews@miercom.com for additional details on the configurations applied to the system under test and test tools used in this evaluation. Miercom recommends customers conduct their own needs analysis study, and test specifically for the expected environment for product deployment before making a product selection.

The Cisco Nexus switches performed exceptionally well and demonstrated advantages over other products we have evaluated, particularly in environments where traffic surges occur. The Cisco Nexus 3064 has proven it can support equal or better traffic throughput while maintaining a lower average latency.

Rob Smithers
CEO
Miercom

2.0 Key Findings

Summary

Latency and Throughput

Latency and throughput was measured running Layer 2 and 3 Full-Mesh, Port-Pair and Multicast RFC Benchmarks on the Nexus 3064.

Results Summary

- The Nexus 3064 maintained a low average latency.
- Nexus 3064 maintained a 100% line rate utilization. This is a fully optimized system making maximum usage of available resources.

Full Mesh

Layer 2 and Layer 3

The Nexus shows low average latency, ranging from 920 to 1400ns. The most important statistic is average latency. The average latency is a real indication of performance capability. Over the fully trafficked switch, the Nexus performance was running at 100% line rate, and had throughput values of 100% for the entire range of frame sizes.

In Layer 3 testing, the Nexus shows its average latency to be low, ranging from 920 to 1410ns in across all frame sizes. The Cisco switch was running at 100% for the duration of the tests.

Pair

Layer 2 and Layer 3

Average latency is a real indication of performance capability. Over the fully trafficked switch, the Nexus latency is 900-1280 ns. In Layer 2 and Layer 3 testing, the Nexus latency is low in all ranges of packets. The Cisco switch was running at 100% for the duration of the tests.

Jitter

Jitter was measured running Layer 2 and 3 Full-Mesh RFC Benchmarks on the Nexus 3064. The 64-port Nexus 3064 exhibited extraordinarily low jitter levels usually experienced by much smaller switches, even with its increased throughput.

In all measurements, the Nexus 3064 showed low jitter measurements, between 6.1ns to 9.7ns that were within the margin of error of the Ixia Traffic generator at less than 20ns for all frame sizes. The Cisco switch was running at 100% for the duration of the tests.

Multicast

Layer 2 and Layer 3

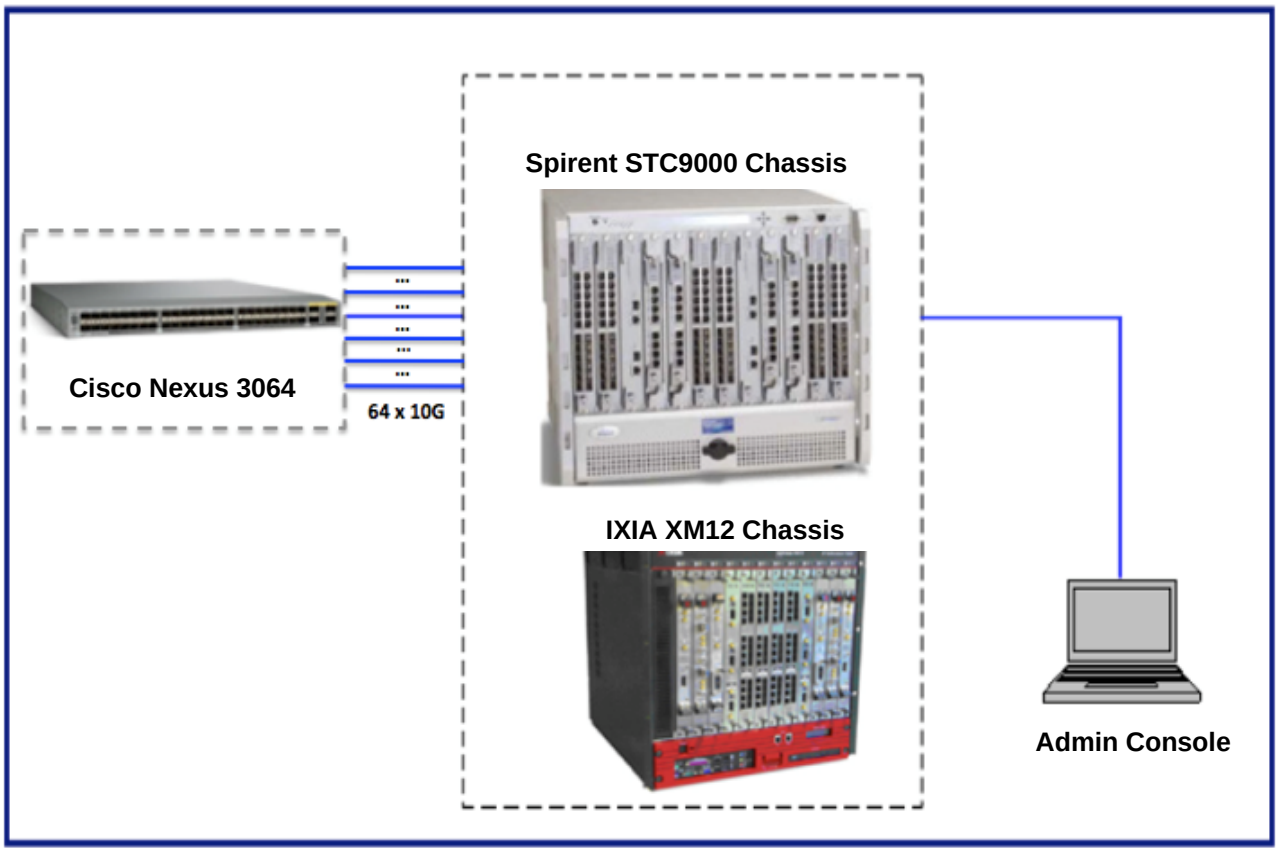
In both Layer 2 and Layer 3 testing, the Nexus latency is low in all frame sizes. Layer 2 and Layer 3 latency ranged between 0.94us to 1.39us.

Features

A detailed feature comparison was completed for the switch, including OSPF, BGP, IP Multicast, IP Services, HA, security and debugging.

The Cisco Nexus 3064 offers a very rich feature set, including very in depth debugging features and a very high level of customization.

3.0 Test Bed Diagram



How We Did It

The tests measured the latency and loss characteristics of datacenter traffic patterns traversing through a network platform. Several traffic profiles were simulated: multicast, mesh unicast, port-pair unicast, jitter; all tests were performed on both Layer 2 and Layer 3. These profiles were selected as they are prevalent traffic flow models in high performance networks.

All tests were conducted for 64-, 128-, 256-, 512-, 768-, 1024-, 1280-, 1518-, 4096- and 9216-byte frame sizes. The term packet and frame are used interchangeably in this report. Note that throughput and overall performance numbers were reported using full Ethernet “frame” size (including header information) and the Spirent test equipment was applied with configuration settings relative to packets, as the control and delivery is IP packet manipulation.

The setup used to conduct testing is shown in the test bed diagram. High load traffic conditions were simulated for 64- through 9216-byte frame sizes utilizing individual latency measurements and packet counts.

The equipment used in testing is:

Cisco Nexus 3064 switch running Cisco NX-OS v 5.0.3.U1.1. The switch is a 1 RU, 10 Gigabit Ethernet switch supporting 64 fixed 10 Gigabit Ethernet ports and one expansion module slot fitted with 4port40 Gigabit module.

Spirent: Spirent TestCenter STC9000 with version 3.51 was used in this evaluation for all the latency and throughput performance testing with its RFC 2544, RFC 2889 and RFC 3918 test

applications. Eight HyperMetrics CV 10G cards on the chassis were used to simulating L2/L3 traffic up to 100% line rate to test all 64 ports of Cisco Nexus 3064.

Ixia: An Ixia XM12 traffic generator was used for jitter measurements with the RFC 2889 benchmarking package. IXIA XM12 was configured running IxOS 5.70.600 build 13, IxNetwork: 5.70.353.33 EA-patch2, IxAutomate 6.90.102.3 GA-SP1. Eight port 10GE LSM cards on the chassis were used to drive Layer 2 and Layer 3 traffic streams simulating high traffic conditions and recording latency and throughput in a very high resolution, with its latest software revision. Note that for the jitter tests, the error margin indicated by IXIA support is within 20 ns.

The tests in this report are intended to be reproducible for customers who wish to recreate them with the appropriate test and measurement equipment. Current or prospective customers interesting in repeating these results may contact reviews@miercom.com for additional details on the configurations applied to the System Under Test and test tools used in this evaluation. Miercom recommends customers conduct their own needs analysis study and test specifically for the expected environment for product deployment before making a product selection.

4.0 Latency

Latency is an important variable to consider. The lower the latency, the faster the device can transmit packets to its final destination. However, sometimes when attempting to achieve a lower latency, packets can be dropped. It is important to have a balance between packet loss and low latency on a switch. The Cisco Nexus 3064 switch is able to achieve this balance. The switch is capable of operating at a low latency level while still maintaining no dropped packets across all the packet sizes that were tested. The Nexus 3064 was subjected to latency test on RFC2544 and RFC3918. Both benchmarking standards were used to test port-pair and full-mesh capabilities of the Nexus 3064 for latency values on Layer 2 and Layer 3. The Nexus 3064 was able to run at full line rate capacity and low latency with no dropped packets during these tests.

4.1 Layer 2 Mesh Latency Test – RFC2544

Description

This test uses the RFC2544 benchmarking test package from Spirent. This test package is capable of measuring switch latency in a full-mesh Layer 2 switching traffic profiles for all 64 10G ports. The test will give measurements for the latency of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. Cisco Nexus 3064 was plugged into the TestCenter directly and all 64 ports of the switch were being utilized.

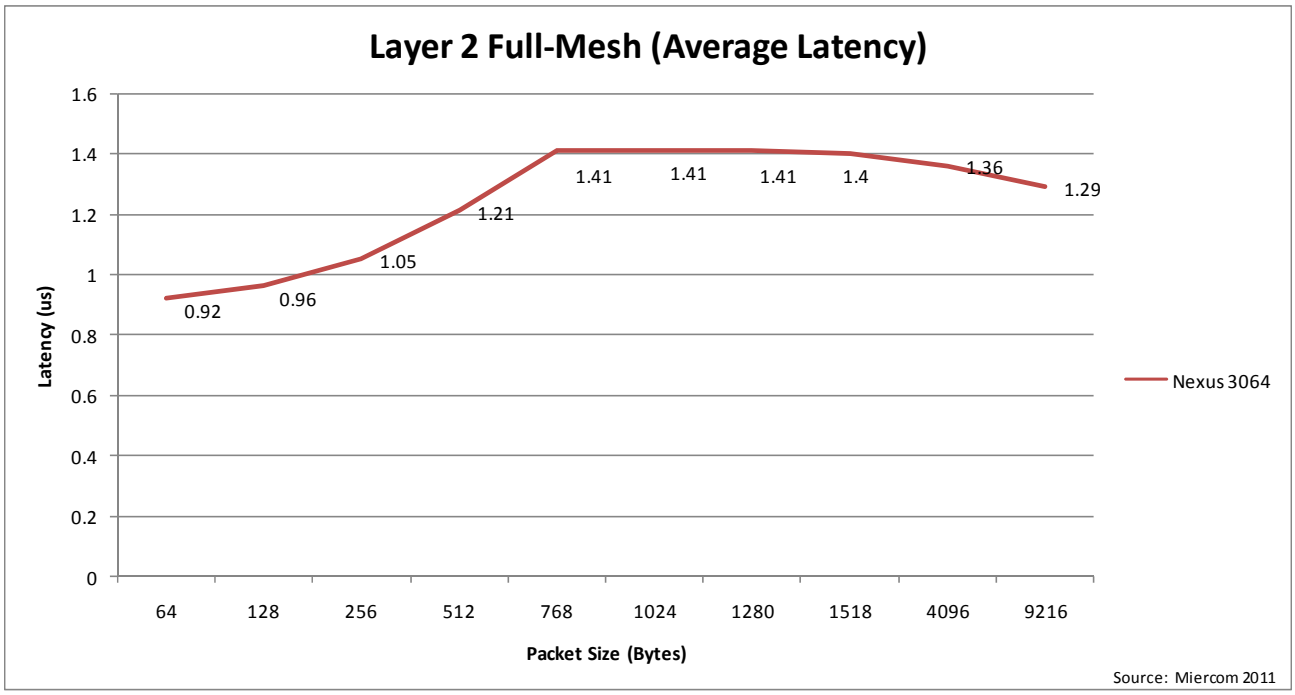
Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities, and cause potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

Observations

Measurements of exact time delay from each individual packet sent from and received by Spirent TestCenter through the Device Under Test (DUT) was recorded. Individual latency was recorded and aggregated by test via Spirent's software. The tests shown here use Layer 2 switching under a full mesh configuration.

Figure 1 – Average Latency (2544 Layer 2 Mesh)



Average latency is a true indication of performance capability. Nexus 3064 ran at 100% line rate capacity during the duration of the test, and ran from 0.92us to 1.4us.

4.2 Layer 3 Mesh Latency Test – RFC 2544

Description

This test uses the RFC2544 benchmarking test package from Spirent. This test package is capable of measuring switch latency in a full-mesh Layer 3 traffic profiles for all 64 10G ports. The test will give measurements for the latency of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. The Cisco Nexus 3064 was plugged into the TestCenter directly and all 64 ports of the switch were being utilized.

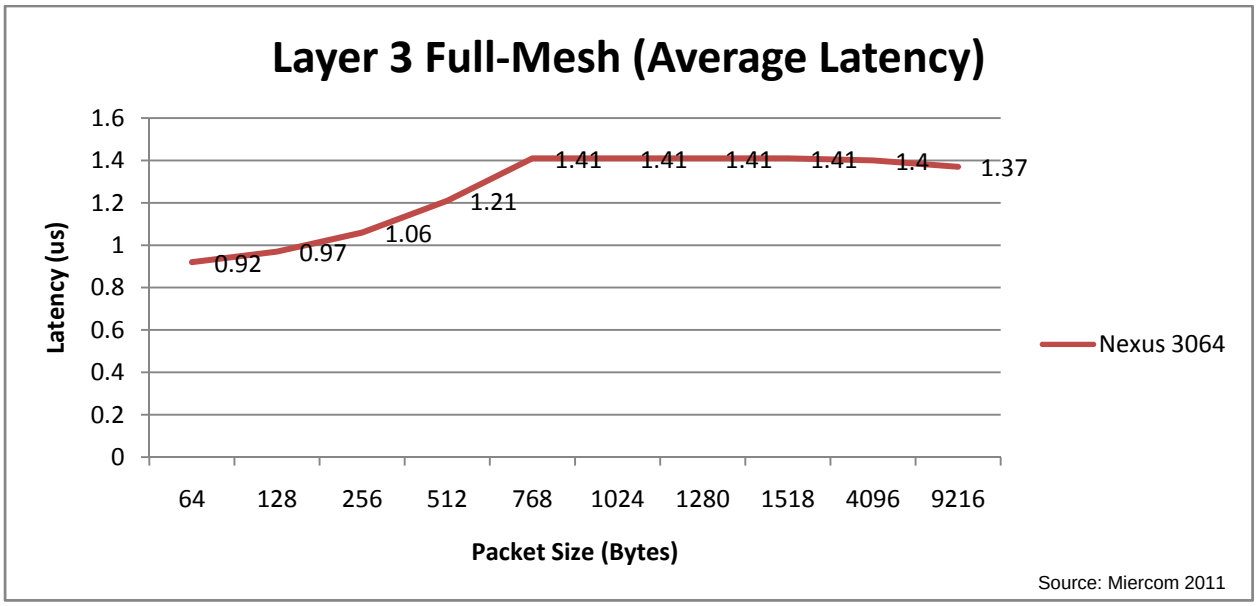
Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities, and is a cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

Observations

Exact time delay from each individual packet sent from and received by Spirent TestCenter through the DUT was recorded. Individual latency was recorded and aggregated by test via Spirent's software. The tests shown here use Layer 3 routing protocols under a full mesh configuration.

Figure 2 - Average Latency (2544 Layer 3 Mesh)



Average latency is a true indication of performance capability. Nexus 3064 ran at 100% line rate capacity during the duration of the test, and ran from 0.92us to 1.41us.

4.3 Layer 2 Mesh Throughput – RFC2544

Description

This test uses the RFC2544 benchmarking test package from Spirent. This test package is capable of measuring switch throughput in a full-mesh Layer 2 switching traffic profiles for all 64 10G ports. The test will give measurements for the throughput of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. The Cisco Nexus 3064 was plugged into the TestCenter directly and all 64 ports of the switch were being utilized.

Metrics

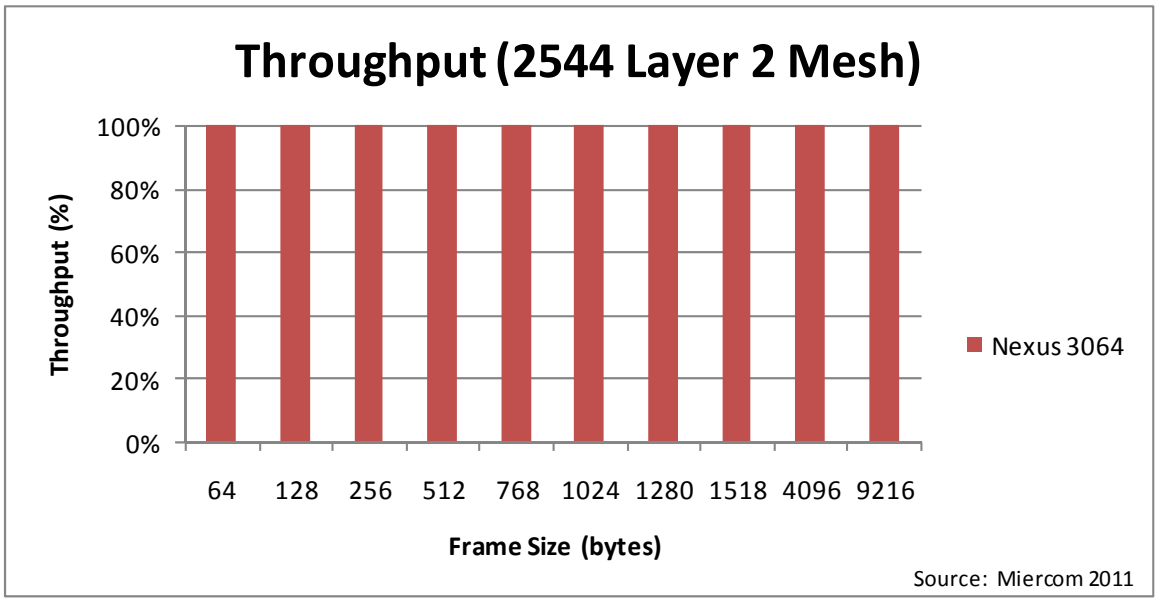
- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

Observations

Cisco Nexus 3064 had throughput values of 100%for the entire range of frame sizes.

Using a lower and upper bound convergence method, the Nexus 3064 was capable of running at 100% line rate capacity.

Figure 3 - Throughput (2544 Layer 2 Mesh)



The Cisco switch was able to run at 100% for the duration of the test.

4.4 Layer 3 Mesh Throughput – RFC2544

Description

This test uses the RFC2544 benchmarking test package from Spirent. This test package is capable of measuring switch throughput in a full-mesh Layer 3 traffic profiles for all 64 10G ports. The test will give measurements for the throughput of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. The Cisco Nexus 3064 was plugged into the Spirent TestCenter directly and all 64 ports of the switch were being utilized.

Metrics

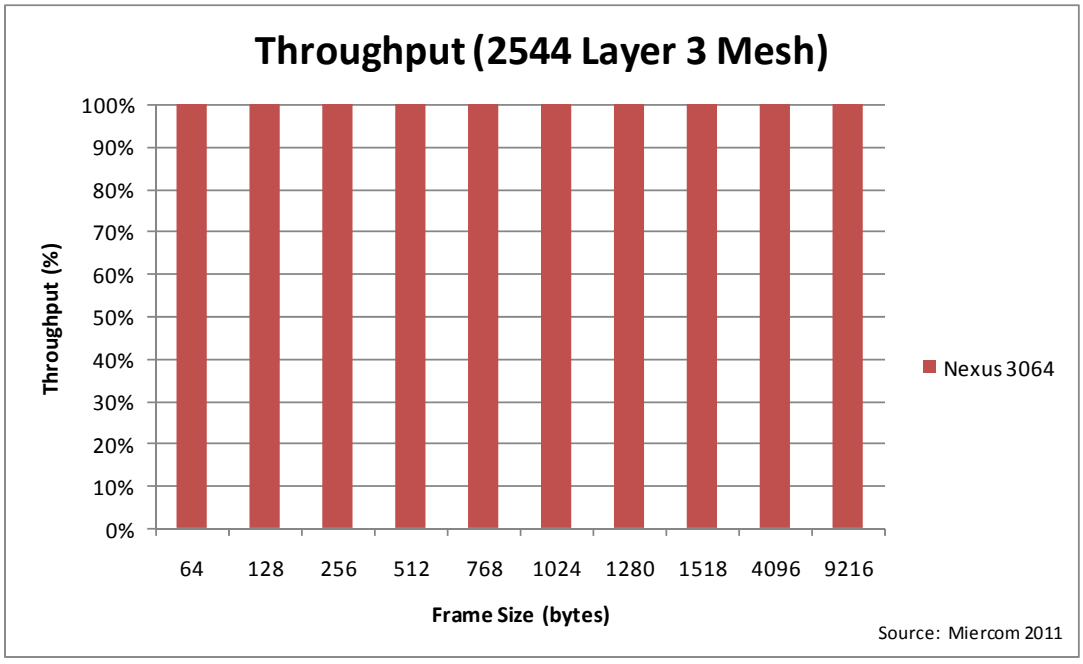
- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

Observations

Cisco Nexus 3064 had throughput values of 100% for the entire range of frame sizes.

The Nexus 3064 on the Layer 3 Mesh throughput tests had performance of 100%.

Figure 4 - Throughput (2544 Layer 3 Mesh)



The Nexus 3064 showed full line rate capacity at 100% on all frame sizes.

4.5 Layer 2 Pair Latency Test – RFC2544

Description

This test uses the RFC2544 benchmarking test package from Spirent. This test package is capable of measuring switch latency in a port-pair Layer 2 switching traffic profiles for all 64 10G ports. The test will give measurements for the latency of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. Cisco Nexus 3064 was plugged into the TestCenter directly and all 64 ports of the switch were being utilized.

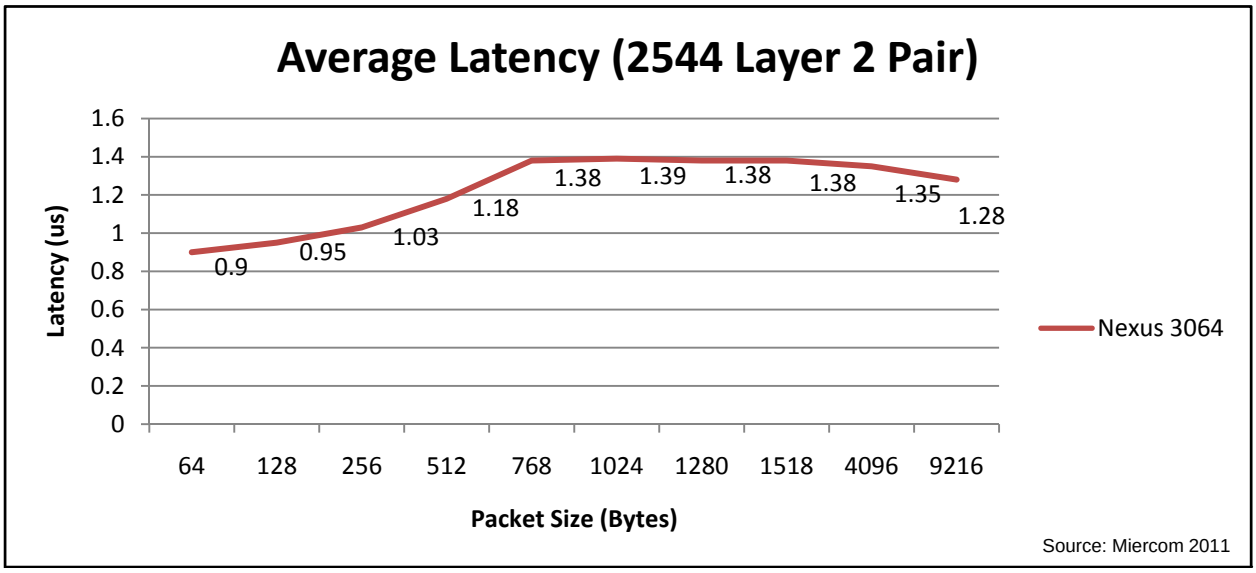
Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

Observations

Exact time delay from each individual packet sent from and received by Spirent TestCenter through the DUT was recorded. Individual latency was recorded and aggregated by test via Spirent's software. The tests shown here were performed using Layer 2 switching under a pair configuration. The Nexus shows its average latency to range from 0.9 to1.38us.

Figure 5 - Average Latency (2544 Layer 2 Pair)



Average latency is a true indication of performance capability. Nexus 3064 ran at 100% line rate capacity during the duration of the test, and ran from 0.9us to 1.38us.

4.6 Layer 3 Pair Latency Test – RFC2544

Description

This test uses the RFC2544 benchmarking test package from Spirent. This test package is capable of measuring switch latency in a port-pair Layer 3 traffic profiles for all 64 10G ports. The test will give measurements for the latency of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. The Cisco Nexus 3064 was plugged into the TestCenter directly and all 64 ports of the switch were being utilized.

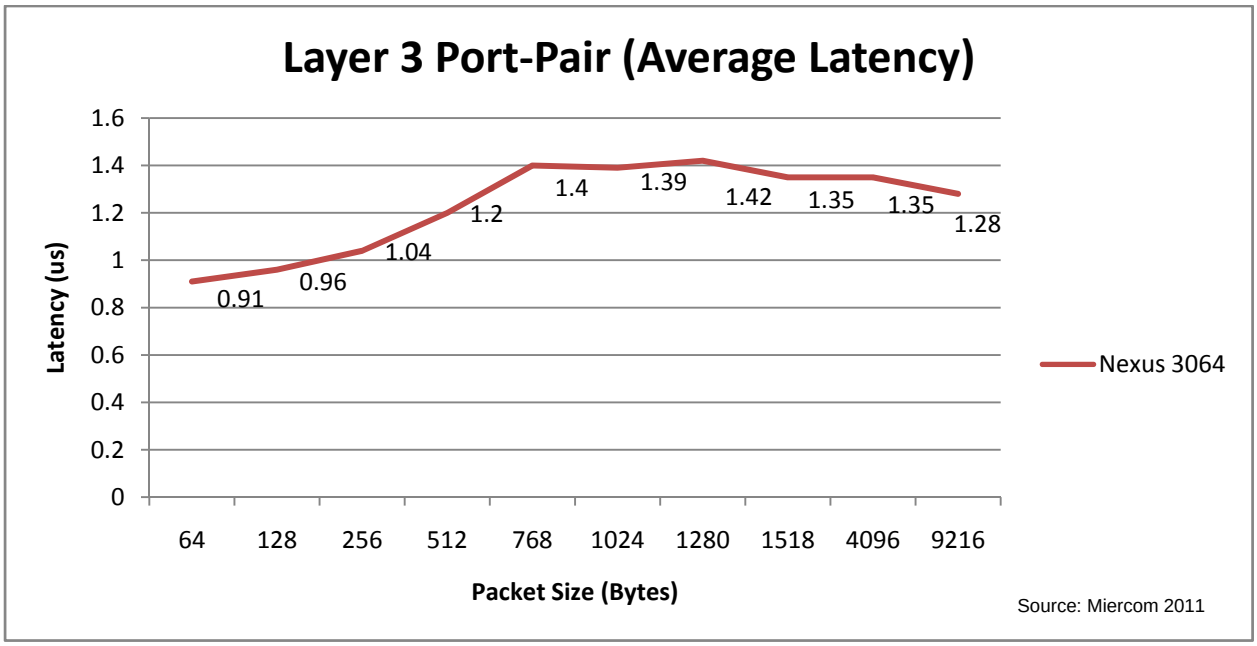
Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities, and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Maximum Thresholds –Whether the thresholds for packet loss and out of sequence packets were exceeded (listed as passed or failed).
- Frame Count – Total frame count used in conjunction with Frame Size and Duration to calculate true quantified measurable throughput, as well as true quantified intended throughput.
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

Observation

Exact time delay from each individual packet sent from and received by Spirent TestCenter through the DUT was recorded. Individual latency was recorded and aggregated by test via Spirent's software. The tests shown here use Layer 3 routing protocols under a pair configuration.

Figure 6 - Average Latency (2544 Layer 3 Pair)



Average latency is a true indication of performance capability. Nexus 3064 ran at 100% line rate capacity during the duration of the test, and ran from 0.91us to 1.42us.

4.7 Layer 2 Pair Throughput Test – RFC2544

Description

This test uses the RFC2544 benchmarking test package from Spirent. This test package is capable of measuring switch throughput in a port-pair Layer 2 switching traffic profiles for all 64 10G ports. The test will give measurements for the throughput of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. The Cisco Nexus 3064 was plugged into the Spirent TestCenter directly and all 64 ports of the switch were being utilized.

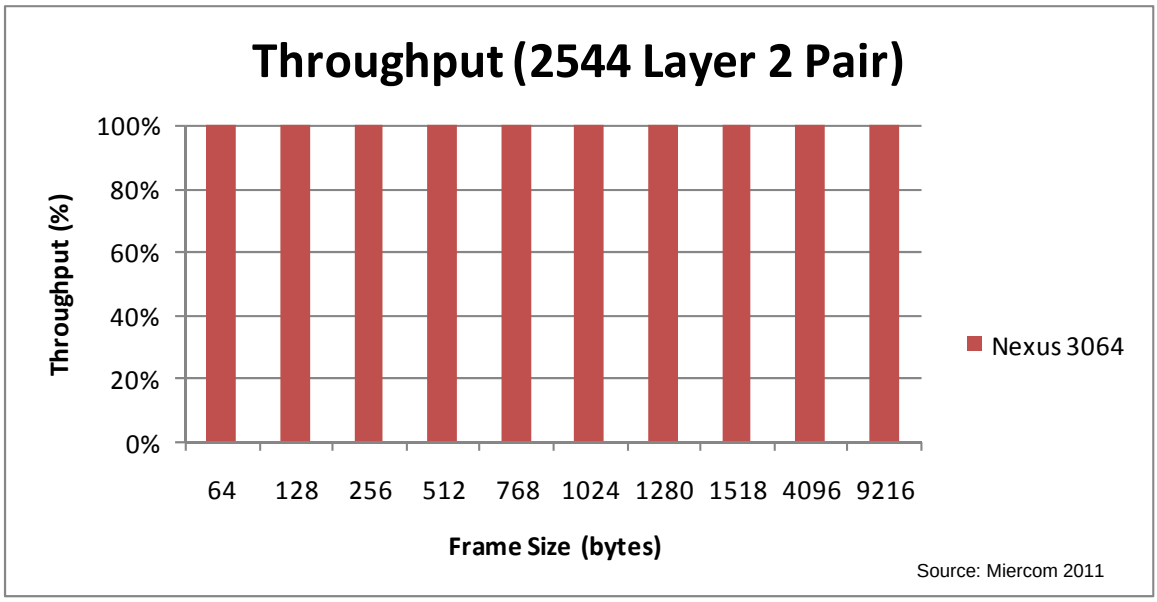
Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities, and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

Observations

On the Layer 2 Pair throughput test, the Cisco Nexus 3064 switch performed at 100% line rate capacity and utilization.

Figure 7 - Throughput (2544 Layer 2 Pair)



The Nexus 3064 showed full line rate capacity at 100% on all frame sizes.

4.8 Layer 3 Pair Throughput Test – RFC 2544

Description

This test uses the RFC2544 benchmarking test package from Spirent. This test package is capable of measuring switch throughput in a port-pair Layer 3 traffic profiles for all 64 10G ports. The test will give measurements for the throughput of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. The Cisco Nexus 3064 was plugged into the TestCenter directly and all 64 ports of the switch were being utilized.

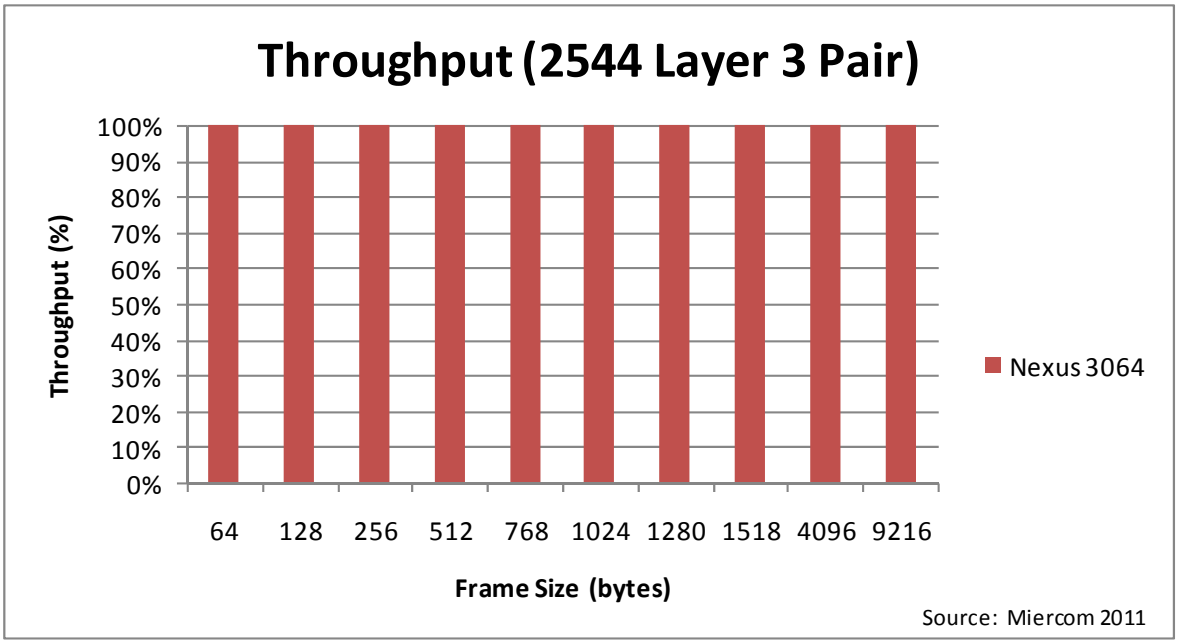
Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

Observations

On the Layer 3 Pair throughput test, the Cisco Nexus 3064 switch performed at 100% line rate capacity and utilization.

Figure 8 - Throughput (2544 Layer 3 Pair)



The Nexus 3064 showed full line rate capacity at 100% on all frame sizes.

4.9 Layer 2 Multicast Latency Test – RFC 3918

Description

This test uses the RFC3918 benchmarking test package from Spirent. This test package is capable of measuring switch latency in a Layer 2 multicast forwarding traffic profiles for all 64 10G ports. The test will give measurements for the latency of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. The Cisco Nexus 3064 was plugged into the TestCenter directly and all 64 ports of the switch were being utilized.

Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

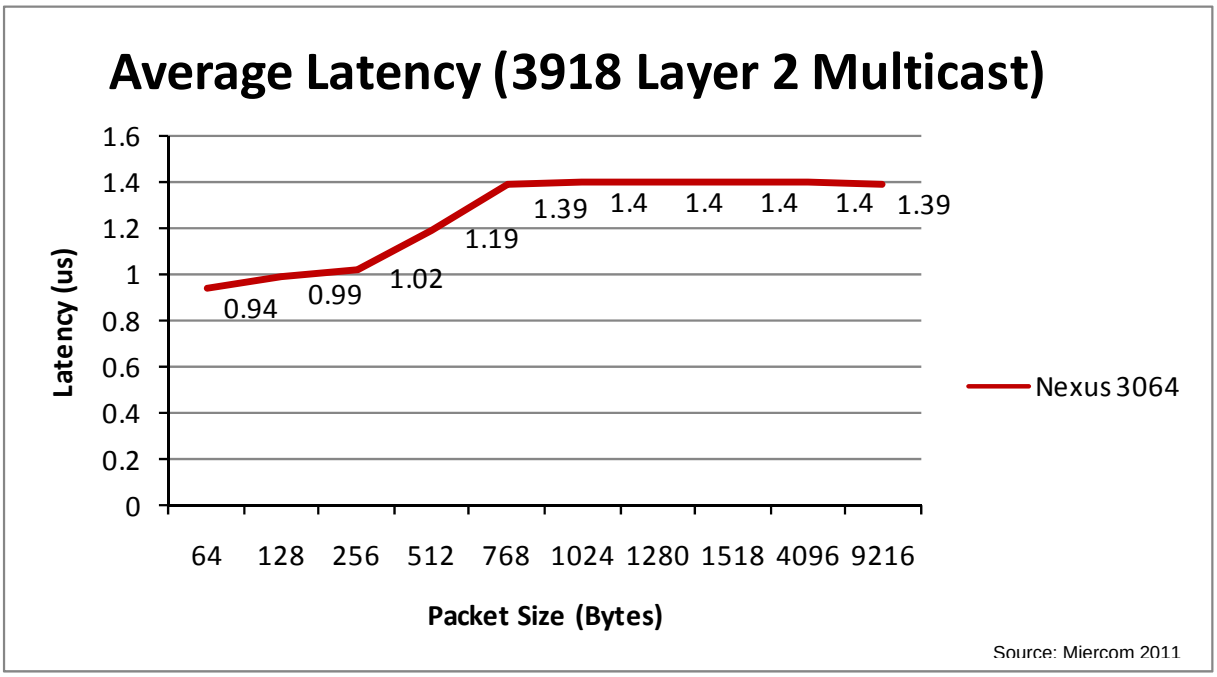
Observations

Exact time delay from each individual packet sent from and received by Spirent TestCenter through the DUT was recorded. Individual latency was recorded and aggregated by test via Spirent's software. The tests shown here use Layer 2 routing protocols under a Multicast configuration.

Figure 9 shows the average latency among all packets for the RFC 3918 test under the Layer 2 Multicast configuration. The Nexus shows its minimum latency to be lower in most ranges except in large and Jumbo Packets.

The latency values for the Cisco Nexus 3064 switch were less than 1.4 microseconds on all frame sizes. As the test progressed and the packet frame size increased, the latency values increase. The Cisco Nexus 3064switch was capable of performing with lower latency until the packet frame sizes reached 768 bytes. After this point, the Cisco Nexus 3064 was able to level off and have consistent latency value for the remainder of the tests without dropping even a single packet.

Figure 9 - Average Latency (3918 Layer 2 Multicast)



Average latency is a true indication of performance capability. Nexus 3064 ran at 100% line rate capacity during the duration of the test, and ran from 0.94us to 1.4us.

4.10 Layer 3 Multicast Latency Test – RFC3918

Description

This test uses the RFC3918 benchmarking test package from Spirent. This test package is capable of measuring switch latency in a Layer 3 multicast forwarding traffic profiles for all 64 10G ports. The test will give measurements for the latency of the switch being tested in average latency values.

Configuration

The test was configured using Spirent TestCenter. The switch that was being tested was plugged into the TestCenter directly and all 64 ports of the switch were being utilized.

Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities, and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Latency (Average) – The latency of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation.

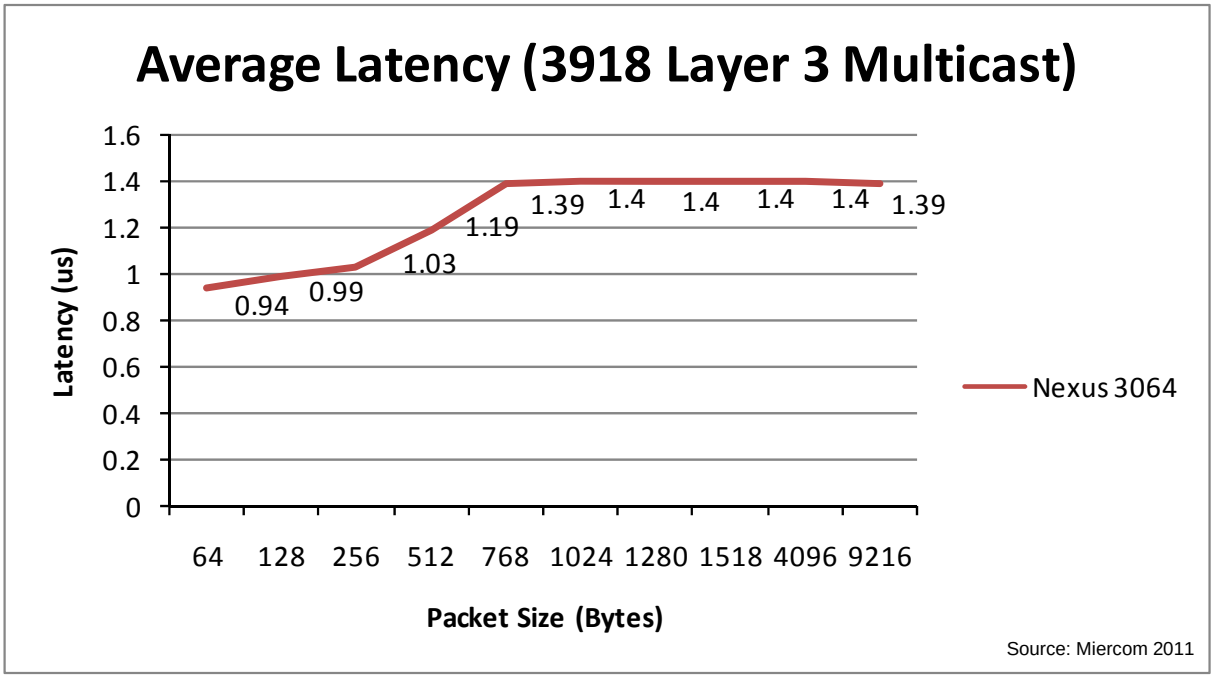
Observations

Exact time delay from each individual packet sent from and received by Spirent TestCenter through the DUT. Individual latency was recorded and aggregated by test via Spirent's software. The tests shown here use Layer 3 routing protocols under a Multicast configuration.

Figure 10 shows the minimum latency among all packets for the RFC 3918 test under the Layer 3 Multicast configuration. The Nexus shows its minimum latency to be lower in all ranges of packet size.

The latency values for the Cisco Nexus 3064 switch were low. As the tests progressed and the packet frame size increased, the latency did as well. The Cisco Nexus 3064 switch was capable of performing with low latency until the packet frame sizes reached 768 bytes. After this point, the Cisco Nexus 3064 was able to level off and have a consistent, still low, latency value for the remainder of the tests.

Figure 10 - Average Latency (3918 Layer 3 Multicast)



Average latency is a true indication of performance capability. Nexus 3064 ran at 100% line rate capacity during the duration of the test, and ran from 0.94us to 1.4us

5.0 Jitter

Jitter is the variance and deviation in the pulses in a high-frequency digital signal, in this case the analysis of Layer 2 and Layer 3 traffic. As the name suggests, jitter can be thought of as shaky data transmissions, or differences in latency.

An innumerable amount of factors weigh in on the cause of jitter, the highest of which is electromagnetic interference, integrity of the hard circuitry, and protocols to collect, transmit, and transfer data packets. By using the benchmarking standard RFC2889 and the Ixia XM12 chassis we can accurately assess the overall effect of jitter and how it plays into the latency values. Low jitter is obviously very desirable, as it indicates there is a strong resiliency in the DUT/SUT. High jitter means there could be a problem with the hardware or software optimization not being able to deliver consistent, reliable results.

5.1 Layer 2 Jitter Measurements

Description

This test uses the RFC 2889 benchmarking test package from Ixia. This RFC test provides measurements for the jitter of the switch, tested in average values.

Configuration

The test was configured using IXIA IxNetwork/IxAutomate. The Cisco Nexus 3064 was plugged directly to the IXIA traffic generator.

Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities, and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Jitter (Average) –RFC 3393 is used as definition and reference.

  A definition of the IP Packet Delay Variation (ipdv) can be given for packets inside a stream of packets. The ipdv of a pair of packets within a stream of packets is defined for a selected pair of packets in the stream going from measurement point MP1 to measurement point MP2. The ipdv is the difference between the one-way-delay of the selected packets.

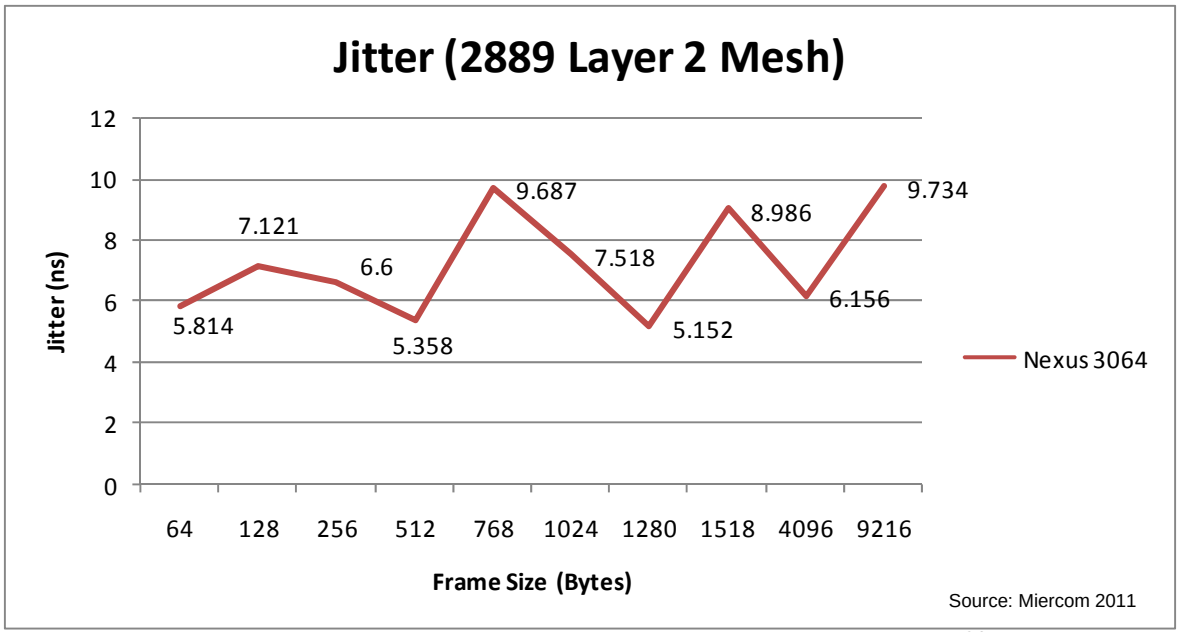
  [snip]'+ L, a packet length in bits. The packets of a Type P packet stream from which the singleton ipdv metric is taken should all be of the same length.

  The jitter of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation. An average value was calculated and is displayed on the graphs.

Observations

Exact time delay from each individual packet sent from and received by the IXIA traffic generator through the DUT was recorded. Individual jitter was recorded and aggregated by test via IXIA software. The tests used Layer 2 environment under a full mesh configuration.

Figure 11 - Layer 2 Full-Mesh Jitter (2889 Full-Mesh)



From our testing we found that the Cisco Nexus 3064 had a low jitter average. In congested networks the Nexus 3064 is capable of processing packets faster, increasing delivery time without any loss of data.

5.2 Layer 3 Jitter Measurements

Description

This test uses the RFC 2889 benchmarking test package from Ixia. This RFC test provides measurements in a full-mesh scenario for the jitter of the switch, tested in average values.

Configuration

The test was configured using IXIA IxNetwork/IxAutomate. The Cisco Nexus 3064 was plugged directly to the IXIA traffic generator, using the same ports, cables and line cards.

Metrics

- Frame Size – Although preconfigured, the frame size is strictly relevant to throughput capabilities, and cause of potential packet loss or out of sequence errors.
- Intended and Offered Loads – In most cases the intended and offered loads were both 100% (or 99.99% as indicated by IEEE standards).
- Jitter (Average) – The RFC 3393 is used as definition and reference.

  A definition of the IP Packet Delay Variation (ipdv) can be given for packets inside a stream of packets. The ipdv of a pair of packets within a stream of packets is defined for a selected pair of packets in the stream going from measurement point MP1 to measurement point MP2. The ipdv is the difference between the one-way-delay of the selected packets.

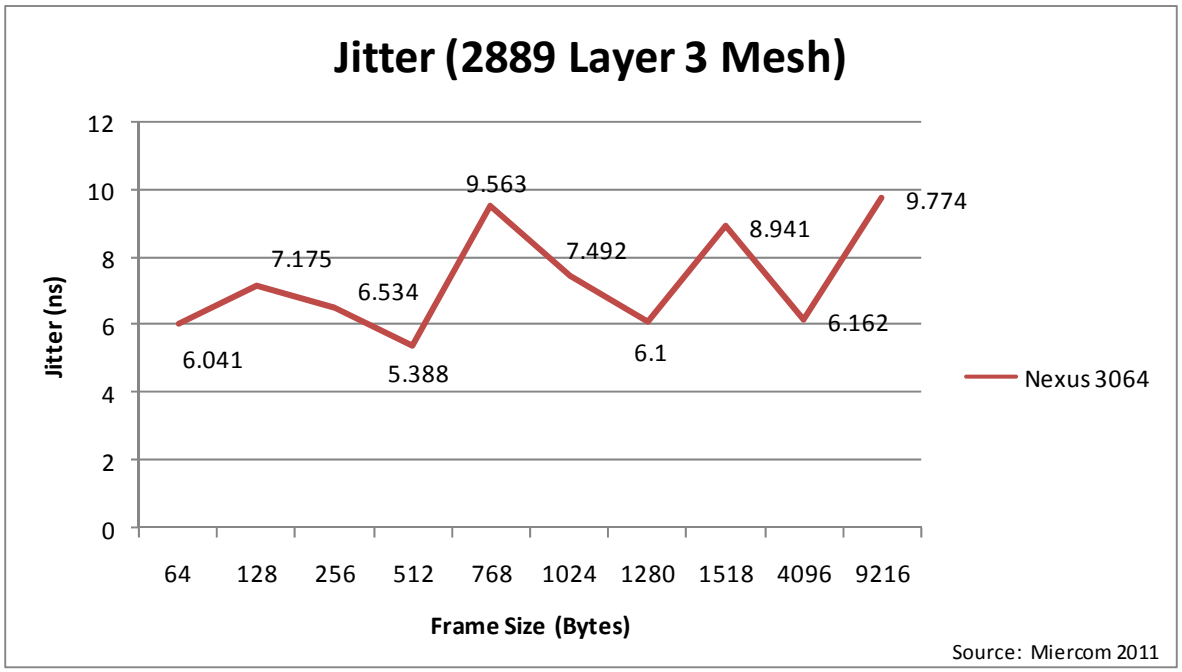
  [snip]'+ L, a packet length in bits. The packets of a Type P packet stream from which the singleton ipdv metric is taken MUST all be of the same length.

  The jitter of each individual packet was measured and aggregated into data tables for general statistics to provide overall information on operation. An average value was calculated and that is the one displayed on the graphs.

Observations

Exact time delay from each individual packet sent from and received by the IXIA traffic generator through the DUT was recorded. Individual jitter was recorded and aggregated by test via IXIA software. The tests shown here use Layer 3 routing protocols under a full mesh configuration.

Figure 12 - Layer 3 Full-Mesh Jitter (2889 Full-Mesh Unicast)



The Cisco Nexus 3064 had a low jitter average. In congested networks the Nexus 3064 is capable of processing packets faster, increasing delivery time without any loss of data.

6.0 Feature and Troubleshooting Capability Information

Description

Using the terminal and telnet interfaces for the switch to detail the features that are readily available to create easily viewable tables. It is important for the switch to have extensive troubleshooting/debug capabilities so that problems can be quickly seen in order to troubleshoot unexpected switch behavior, such as network outrage, packet drop or anything that is not normal.

NX-OS on Nexus 3064 is a full-featured, modular, and scalable network operating system. It offers the most comprehensive feature set in the industry. The following tables list only some of the key features to enable customers to successfully deploy the Nexus 3064 in a mission-critical production network.

Table 1 - OSPF Detailed Information

Category	Key Features	Nexus 3000
Base andRoute Control	Virtual-Link	Yes
	Opaque LSAs Support	Yes
	OSPF MIB	Yes
	Totally Stubby Area	Yes
	Route Redistribution between Routing	Yes
	Route-Map to Filtering Routes	Yes
	Limit No. of Redistributed Routes	Yes
	Route Summarization – Inter area / External Route	Yes
	Multiple OSPF Instances	Yes
HA and Fast Convergence	Graceful Restart Helper	Yes
	OSPFv2 Stub Router Advertisements	Yes
	SPF Optimization – SPF Timers	Yes
	Tune Timers: LSA Arrival / Pacing / Throttle / Throttle SPF Calculation / Hello	Yes

The Nexus 3064 switch has a full range of options available for configuring route control and convergence.This table illustrates the options native to the switch with regards to base and route control.

Table 2 - BGP Detailed Information

Category	Key Features	Nexus 3000
Base and Route Attribute Control	Route Redistribution from Other Protocols with Route-map	Yes
	Route Dampening	Yes
	Authentication - Simple and MD5	Yes
	Route filtering with Route-map - Match: AS-Number / AS-PATH List / Community-list / IP Prefix-list	Yes
	MBGP	Yes
	BGP ECMP	Yes
	Limit EBGP AS-path Attribute	Yes
	BGP Conditional Advertisement	Yes
Large Scale BGP	4-byte AS Number	Yes
	Router Reflector	Yes
	AS Confederation	Yes
	Multi-hop EBGP	Yes
	Peer-template	Yes
HA and Fast Convergence	BGP Scan Timer and Best Path Algorithm	Yes
	Graceful Restart Helper	Yes
	BGP Next-Hop Address Tracking	Yes
	Enable / Disable Fast External Failover	Yes
	Low Memory Handling	Yes

The Nexus 3064 switch has extensive features for configuring BGP.This table illustrates all the Border Gateway Protocol features of the switch.

Table 3 - IP Multicast Detailed Information

Category	Key Features	Nexus 3000
Basic	PIM-SM	Yes
	PIM-SSM	Yes
	PIM Static RP	Yes
	PIM Auto-RP	Yes
	PIM BSR	Yes
Advanced	MSDP	Yes
	Anycast-RP	Yes
	Neighbor Filtering	Yes
	Accept Register	Yes
	Register Rate-limiting	Yes
	PIM Stub	Yes
	PIM Timer	Yes
	Shared Tree Only/SPT Infinite	Yes

These are all the IP Multicast features that are inherently present on the Nexus 3064 switch. The Nexus 3064 has a wide variety of options available for configuration.

Table 4 - IP Services, Virtualization, Security, Redundancy, and Others

Category	Key Features	Nexus 3000
IP Service	DHCP Snooping	Yes
Security	DAI	Yes
	IPSG	Yes
	Private VLAN	Yes
	Ingress / Egress ACL	Yes
	RACL	Yes
	VACL	Yes
Virtualization	Vrf-lite (OSPF, BGP, EIGRP)	Yes
	Vrf-lite Multicast	Yes
	Vrf-aware DHCP Relay	Yes
Redundancy, QoS and Others	HSRP / VRRP	Yes
	QoS Classifying based on IP Header Information PBR	Yes
	QoS – Bandwidth and Queuing ManagementQoS Classifying based on IP Header Information	Yes
	QoS – Bandwidth and Queuing Management	Yes

IP, Security, Virtualization, and Redundancy features of the Nexus 3064 are illustrated above. This switch is capable of supporting a variety of features and configuration methods as shown in this table.

Table 5 - Debugging Capabilities

Category	Key Features	Nexus 3000
System, L2, etc	Debug platform	Yes
	Debug Spanning-tree	Yes
	Debug NTP	Yes
Basic IP and IP Service	Debug IP ACL	Yes
	Debug ARP	Yes
	Debug ICMP	Yes
	Debug IP Packet	Yes
	Debug SNMP	Yes
	Debug LACP	Yes
IP Routing	Debug OSPF and All Sub-options	Yes
	Debug BGP and All Sub-options	Yes
	Debug IP Routing	Yes
Multicast	Debug IGMP and IGMP Snooping	Yes
	Debug PIM and RP	Yes
	Debug mpacket	Yes
	Debug mrouting	Yes

Cisco Nexus 3064 has a complete set of debugging capabilities. These commands are first level options. Some NX-OS debug commands can go up to three levels.

7.0 Bottom Line

The Cisco Nexus 3064 Switch is a high-performance, high-density, ultra-low-latency Ethernet switch that is part of the new Cisco Nexus 3000 Series Switches. The Cisco Nexus 3064 supports a wide variety of 1/10 Gigabit Ethernet connectivity options. 1 and 10 Gigabit Ethernet connectivity is achieved using SFP+ transceivers in the first 48 ports, and 4 x 10GbE connectivity is achieved by using QSFP+ transceivers in the last 4 ports. QSFP+ technology allows smooth transition from 10 to 40 Gigabit Ethernet infrastructure in data centers. The Cisco Nexus 3064 supports connectivity over copper and fiber cables, providing excellent physical-layer flexibility. It is capable of processing all packets at line rate without any drops.

We tested its low latency abilities at different frame sizes ranging from 64 to 9,216 bytes. At each frame size, the Nexus 3064 performed better than similar switches we have observed in prior testing, showing both low latency and low jitter. With its low latency capabilities, packets can be processed faster without error allowing more data to be processed through the network.

Some features we reviewed in our testing included BGP, OSPF, EIGRP and RIPv2. When compared to features of similar products, the Nexus 3064 was able to offer all of their features plus numerous extras, as well as several more Cisco proprietary protocols.

8.0 About Miercom

Miercom has hundreds of product-comparison analyses published over the years in leading network trade periodicals including Network World, Business Communications Review, Tech Web - NoJitter, Communications News, xchange, Internet Telephony and other leading publications. Miercom's reputation as the leading, independent product test center is unquestioned.

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