

D-Link xStack DGS-3620-52P Gigabit Layer 3 Managed Switch

Performance and Power Consumption Comparison Versus Cisco Systems Catalyst 3560-X

EXECUTIVE SUMMARY

Stackable L2/L3 managed switches provide scalability and flexibility in a compact form factor. While high-performance is mandatory for such devices, acquisition costs and power efficiency are important considerations as well.

D-Link Systems commissioned Tolly to evaluate its xStack DGS-3620-52P switch running the Enhanced Image and compare that to a Cisco Systems Catalyst 3560-X switch. Tests were conducted using 48 Gigabit Ethernet ports at both layer 2 and layer 3 and included ATIS power consumption measurements.

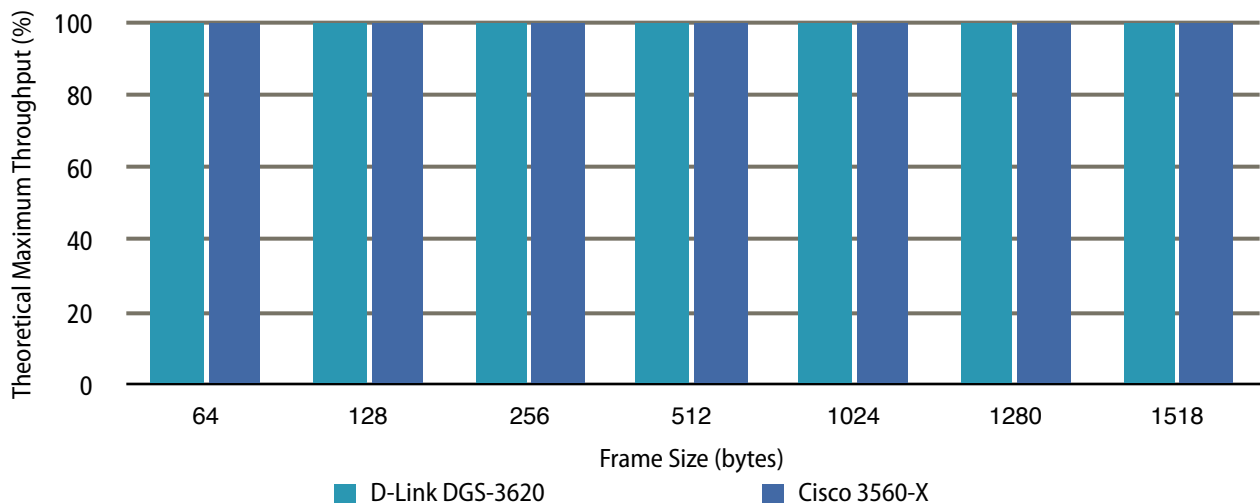
The D-Link Systems switch matched the performance of the Cisco Systems Catalyst across all the performance tests. In addition, the D-Link DGS-3620 has a significantly lower purchase price and consumes much less power than the Cisco Systems Catalyst 3560-X. ...<continued on next page>

THE BOTTOM LINE

The D-Link DGS-3620 delivers:

- 1 Line-rate throughput across all 48 ports – equivalent to the Cisco Systems Catalyst 3560
- 2 Latency that is comparable to or lower than the Cisco Systems switch
- 3 Cost-per-Gigabit that is 28% lower than the Cisco Systems switch
- 4 Power consumption that is 45% lower than the Cisco Systems switch using the ATIS model

Layer 2 Gigabit Ethernet Switch Throughput
Across 48 Ports in a Full-Mesh Configuration
(as reported by Ixia IxNetwork 7.40)



Source: Tolly, January 2015

Figure 1



Both switches under test provide fixed configurations of 48 Gigabit Ethernet ports. The D-Link also offers support for four Gigabit SFP or 10GbE SFP+ ports. While switches were tested with single power supply, both supported a second power supply. While both switches provide Power over Ethernet (PoE), that feature was not tested. See The Test Methodology section for additional details about the systems under test and the specifics of the tests.

L2 Throughput and Latency

Industry-standard RFC 2544 Throughput tests of multiple frame sizes, from 64-bytes to 1518-bytes, proved that the D-Link DGS-3620 switch delivers the same line-rate L2 throughput as the competing switch. See Figure 1.

Similarly, latency tests showed that the D-Link switch delivered better or equivalent latency when compared with the Cisco Systems switch. See Figure 2.

L3 Throughput and Latency

Industry-standard RFC 2544 Throughput tests of multiple frame sizes, from 64-bytes to 1518-bytes, proved that the D-Link switch delivers the same line-rate L3 throughput as the competing switch. See Figure 3.

Similarly, latency tests showed that the D-Link switch delivered better or equivalent latency when compared with the Cisco Systems switch. See Figure 4.

Cost Per Gigabit


Tolly engineers also evaluated the relative cost of the switches by calculating the cost-per-gigabit-per-second of throughput.

As tested, the D-Link switch had a cost of \$6,589.98 while the Cisco Systems switch had a cost of \$9,209.99. This cost did not include any additional features or maintenance.

D-Link Systems, Inc.

xStack DGS-3620-52P

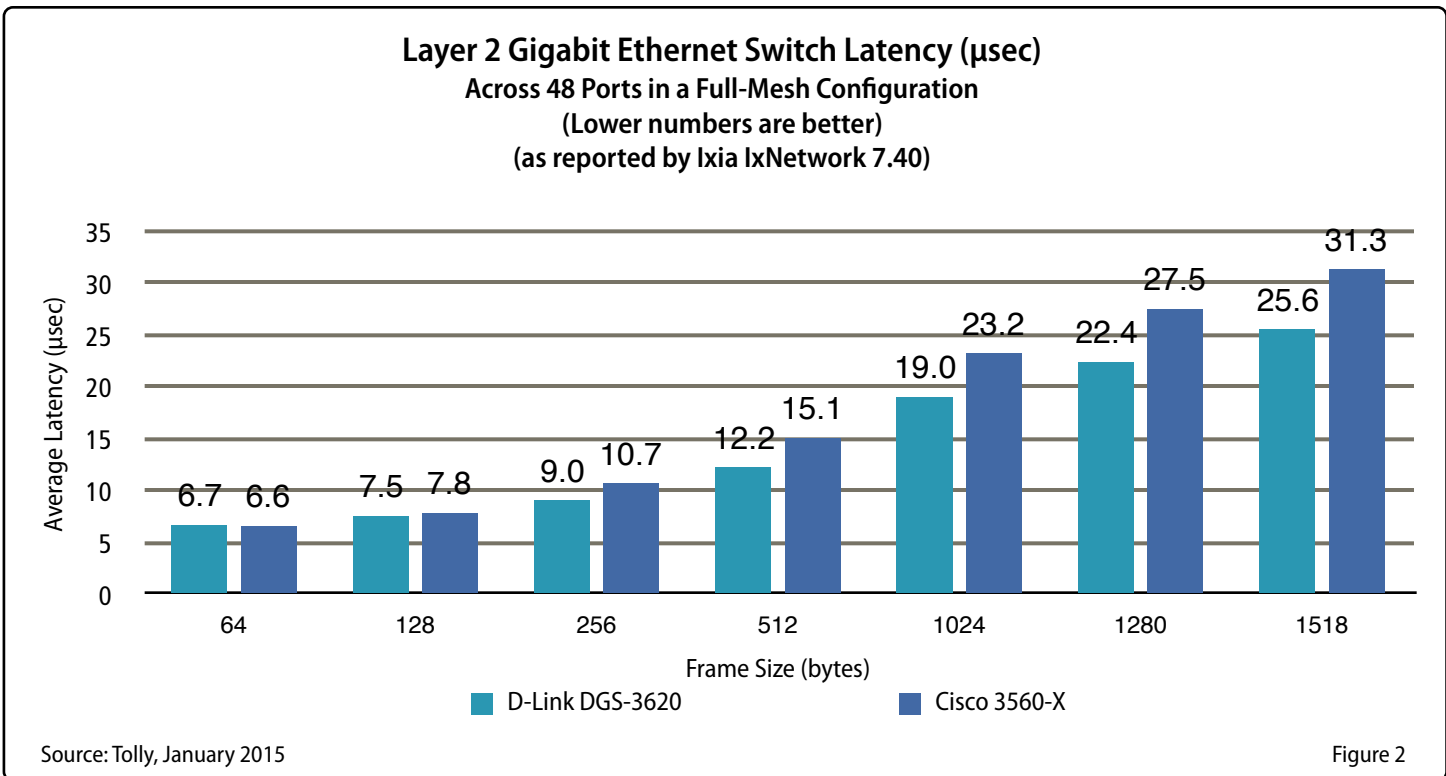
L2/L3 Performance & Power Consumption



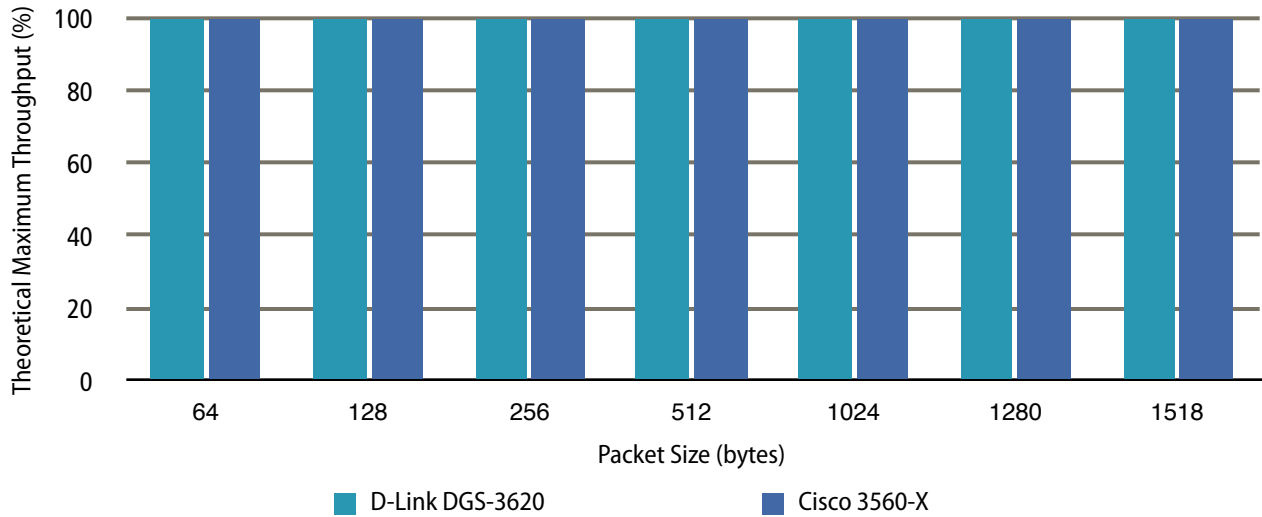
Tested January 2015

Dividing each of these values by the 48 wire-speed ports gave a cost per Gigabit per second of throughput value of \$191.87 for Cisco Systems and \$137.29 for D-Link - The D-Link cost being 28% lower than the Cisco Systems Catalyst switch. See Table 1.

In addition to the 48 ports, the D-Link switch provides 4 10GbE slots that can be used for stacking or aggregation.



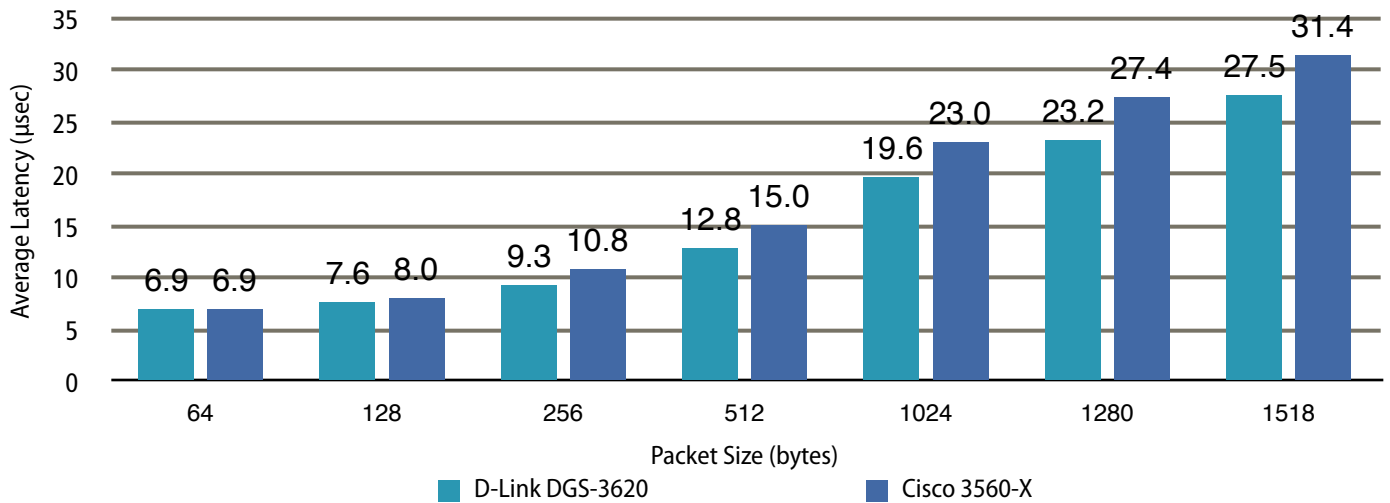
Layer 3 IPv4 Gigabit Ethernet Switch Throughput Across 48 Ports in a Full-Mesh Configuration (as reported by Ixia IxNetwork 7.40)



Source: Tolly, January 2015

Figure 3

Layer 3 IPv4 Gigabit Ethernet Switch Average Latency (µsec) Across 48 Ports in a Full-Mesh Configuration (Lower numbers are better) (as reported by Ixia IxNetwork 7.40)



Source: Tolly, January 2015

Figure 4



48-Port Gigabit Ethernet Switch Power Consumption and Cost Per Gigabit of Throughput

Solution	Power Consumption (W) at ATIS Traffic Loads (lower is better)			ATIS Weighted Average Power (W _{ATIS}) (lower is better)		Cost per Gigabit Per Second of Throughput	
	Idle	10%	100%		% Improvement: D-Link vs. Cisco		% Improvement: D-Link vs. Cisco
D-Link DGS-3620	71.9	70.6	72.1	70.88	44.64	\$137.29	28.45
Cisco Catalyst 3560X	127.7	127.7	131.0	128.03	N/A	\$191.87	N/A

Note: See pricing information elsewhere in this document for details of system prices. Systems tested with single power supply. ATIS value is calculated by as 80% of the 10% load value plus 10% each of the idle and 100% load values. For idle, ports are active (green LED) but no traffic is running.

Source: Tolly, January 2015

Table 1

ATIS Power Consumption

Finally, Tolly engineers evaluated the power consumption of the two switches. The ATIS approach dictates that the power consumption of the switch be measured at different levels of activity. A lower ATIS value is a better result indicating lower power consumption.

The ATIS value for the Cisco Systems Catalyst switch was 128.03 compared to only 70.88 for the D-Link DGS-3620. This represents 45% lower power consumption for the D-Link switch. The lower power consumption of the D-Link switch provides long-term benefits to the total cost of ownership for the system.

Test Setup & Methodology

Switches under test were managed L2/L3 switches and provided at least 48 ports of Gigabit Ethernet (1000Base-T) connectivity. See Table 2.

All performance testing used 48 ports. Default device configurations were used as

the basis for all tests. L3 test required basic IPv4 routing configurations for each device.

Performance

All tests were run using Ixia's IxNetwork 7.40 running on a Microsoft Windows 7 system. Two Ixia Optixia XM2 chassis were outfitted with copper Gigabit Ethernet ports. The Optixia chassis ran IxServer 6.8.

L2/L3 Throughput & Latency Tests

The Ixia RFC 2544 templates were used for all throughput and latency tests. All tests were run using the following frame sizes: 64-, 256-, 512-, 1024-, 1280-, and 1518-bytes of full-mesh layer 2 or layer 3 traffic as appropriate. All tests were run three times for a duration of one minute each. The average of the three runs was reported.

For the throughput test, the constant loading traffic profile was used with a loss tolerance of zero percent.

For the latency test, the constant loading traffic profile was used and the rate was set to 100%. Store and forward latency was measured.

Cost Per Gigabit

Cost per gigabit per second of throughput was calculated by taking price of the system and dividing it by the system throughput. Since both devices delivered wire-speed throughput at all frame/packet sizes, the throughput value was 48 Gbps.

No maintenance, power, taxes or other costs were included in the calculation. For the cost listed, D-Link includes a lifetime, next-business-day warranty. Prices as listed at PC Mall website as of February 5, 2015.

Power Consumption

ATIS

Tolly engineers benchmarked the power consumption of each solution using 48 Gigabit Ethernet ports and one power supply. PoE was not tested.

Testing was conducted in accordance with ATIS document ATIS-0600015.03.2009 - *Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting for Router and Ethernet Switch Products*. In the ATIS calculation, a lower value is better.

Managed, L2/L3 Gigabit Ethernet Switches Under Test

Vendor	Product	Description	Vendor SKU	PC Mall Part #	PC Mall Price	Firmware	Notes
D-Link Systems	xStack DGS-3620-52P	52-port Gigabit Ethernet PoE Managed Switch	DGS-3620-52P with Enhanced Image(EI) upgrade	Switch: 8843747, EI upgrade: 9285361	\$6,589.98	2.60.016 (Hardware version B1)	One power supply. Tested with 48 ports.
Cisco Systems	Catalyst 3560X-48P-E	48-Port Gigabit Ethernet PoE Managed Switch	WS-C3560X-48P-E	9107763	\$9,209.99	12.2 (Hardware V06)	One power supply. Tested with 48 ports.

Note: PC Mall (pcm.com) price as of 2015-02-05. Pricing for unit as listed only, no additional maintenance. For the price above, D-Link provides a lifetime/next-business-day warranty. Both switches support an additional power supply and provide PoE (not tested).

Source: Tolly, January/February 2015

Table 2



Power was measured using a WattsUp Pro power meter.

Relative Performance Calculation

To calculate how much better one solution is than another, the formula used is $1 - (N1/N2)$ where N1 is the better result and N2 is the worse result. This is multiplied by 100 to give the percentage benefit.

Test Equipment Summary

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

Vendor	Product	Web
Ixia	Optixia XM2 Software: IxNetwork 7.40	 http://www.ixiacom.com
Siemon	Cable Infrastructure	 http://www.siemon.com



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

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

Interaction with Competitors

In accordance with Tolly's Fair Testing Charter, Tolly personnel invited representatives from Cisco Systems to participate in the testing. Cisco Systems did respond to the invitation.

For more information on the Tolly Fair Testing Charter, visit:

<http://www.tolly.com/FTC.aspx>



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