

Coyote Point Systems Inc. Equalizer E350si Competitive Performance Evaluation versus F5 Networks BIG-IP 1500 and BIG-IP 3400



Test Summary

Premise: Scaling a Web site means running multiple back-end servers with a sophisticated traffic management device to distribute the incoming load efficiently and to maximize the server farm performance. Layer 4-7 Network Traffic Management Systems or Web switches must offer sufficient performance. But most of all, they must demonstrate that they offer a competitive price/performance to ensure maximum value and effectiveness in actual customer deployments.

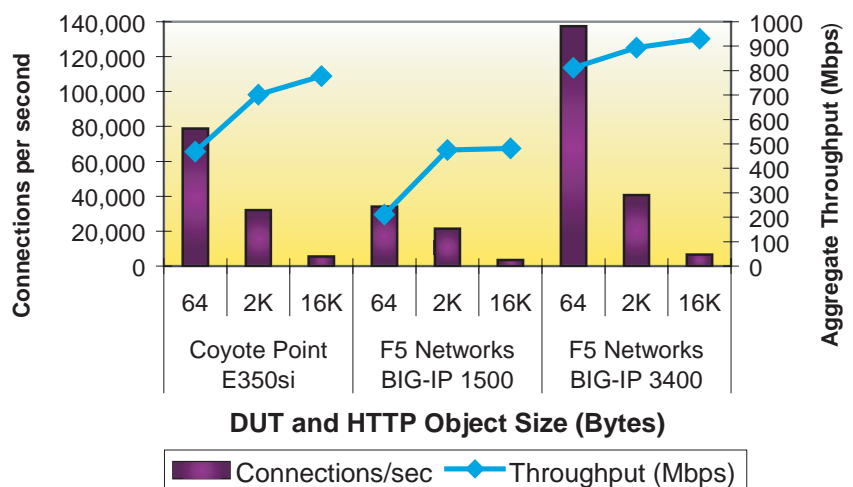
Coyote Point Systems Inc. commissioned The Tolly Group to evaluate the Equalizer E350si, an entry-level Layer 4-7 load-balancing switch designed to serve up Enterprise-class performance in a cost effective fashion. (Coyote Point markets higher end switches, as well.) Furthermore, Coyote Point asked The Tolly Group to evaluate the Equalizer E350si solution alongside several comparable offerings from F5 Networks.

Tolly Group engineers tested the Equalizer E350si, measuring its Layer 4 connection rate, Layer 7 transaction rate and aggregate throughput (Mbps) at both Layer 4 and Layer 7. Engineers benchmarked the performance of the Equalizer E350si against an F5

Test Highlights

- Delivers more connections per second than the F5 BIG-IP 1500 in every object size tested, at less than 40% the price
- Achieves more than twice the connection rate supported by the F5 Networks BIG-IP 1500 at four 64-byte objects, at almost one-sixth the cost-per-connection of F5's BIG-IP 1500
- Offers a Layer 4 switching cost-per-Mbps of throughput of \$12.79, which is almost six times less than the cost-per-Mbps of throughput achieved by the BIG-IP 1500
- Supports 30% more Layer 7 transactions-per-second at 64-byte objects than the BIG-IP 1500 (44,375 tps vs. 34,199 tps) and 30% greater throughput (199 Mbps vs. 151 Mbps)

Steady-state Layer 4 Switching Connection Rate With Various Object Sizes (As reported by Spirent Avalanche)

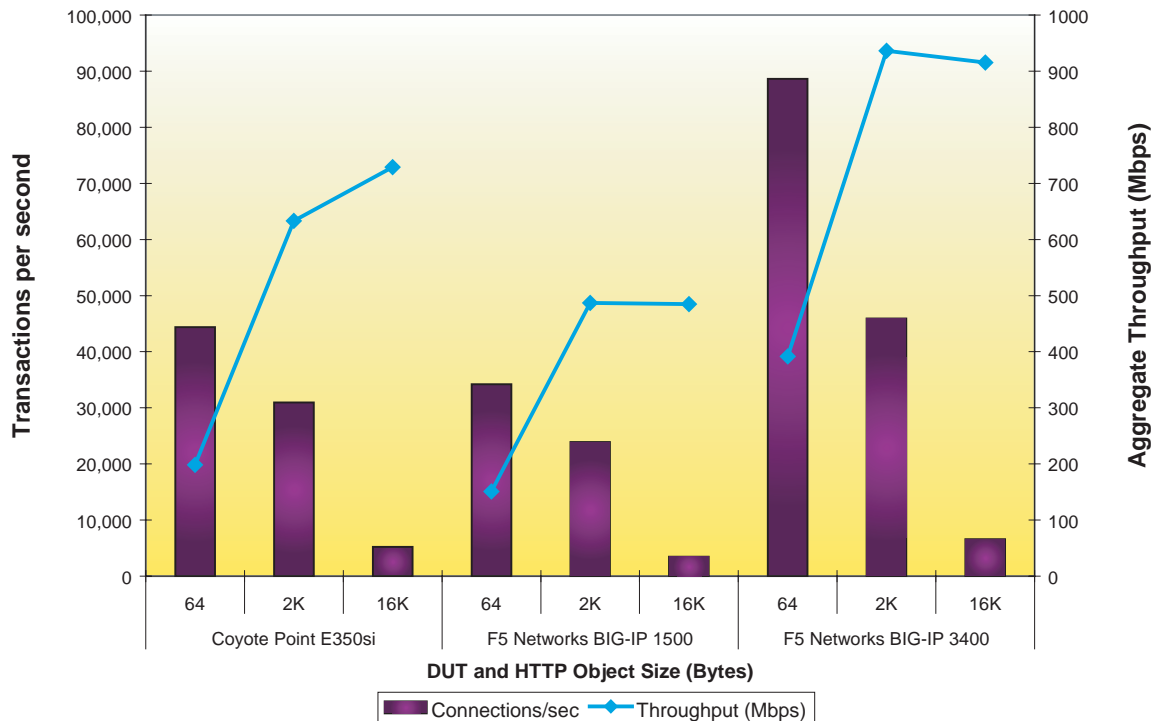


Note: The Equalizer E350si was configured to support eight Fast Ethernet ports on the server side, and one Gigabit Ethernet port on the client side. The F5 Networks BIG-IP 1500 and BIG-IP 3400 each were configured to support two GbE ports on the server side and two GbE ports on the client side.

Source: The Tolly Group, September 2005

Figure 1

Steady-state Layer 7 Switching Transaction Rate With Various Object Sizes (As reported by Spirent Avalanche)



Note: The Equalizer E350si was configured to support eight Fast Ethernet ports on the server side, and one Gigabit Ethernet port on the client side. The F5 Networks BIG-IP 1500 and BIG-IP 3400 each were configured to support two GbE ports on the server side and two GbE ports on the client side.

Source: The Tolly Group, September 2005

Figure 2

Networks BIG-IP 1500 and a BIG-IP 3400, two devices that cost 2.5X to almost 4X more than the Equalizer E350si.

Coyote Point intended to demonstrate that its Equalizer E350si offers more attractive price/performance than the F5 Networks products.

For the tests the Equalizer E350si was configured to support eight Fast Ethernet ports on the server side, and one Gigabit Ethernet port on the client side. (The Equalizer E350si contains an integrated Layer 2 switch, which allows it to achieve high aggregate throughput.) The F5

Networks BIG-IP 1500 and BIG-IP 3400 each were configured to support two GbE ports on the server side and two GbE ports on the client side. (The BIG-IP 1500 supports six GbE ports total, and the BIG-IP 3400 supports 10 GbE ports.)

Tests were conducted by Tolly Group engineers in September 2005 at Tolly Group headquarters in Boca Raton, FL. The test methodology and test results were shared with F5 Networks. Results show that the Equalizer E350si outperformed the BIG-IP 1500 in every test, offered near-comparable performance

to the much more expensive BIG-IP 3400, and offered compelling price/performance advantages.

RESULTS AND ANALYSIS

LAYER 4 PERFORMANCE

Network managers who install Layer 4-7 switches need to examine the network performance of prospective devices. Any such evaluation should include the switch's connection rate and average aggregate

throughput when processing objects of various sizes, when it runs in Layer 4 switching mode.

Tolly Group engineers measured the steady-state connection-per-second rate and throughput in Layer 4 switching tests for the three devices under test, subjecting them to traffic streams with object sizes of 64 bytes, 2K (2,048) bytes and 16K bytes each in separate tests. In all of the tests, Coyote Point's Equalizer E350si outperformed F5's BIG-IP 1500. F5's BIG-IP 3400 outperformed Coyote Point's E350si in all of the tests but the performance gap narrowed as the object sizes increased.

Tests show that the Coyote Point Equalizer E350si supported 78,885 connections per second (cps) when handling 64-byte objects, or more than twice the connection rate supported by the F5 Networks BIG-IP 1500. The more costly BIG-IP 3400 sustained a connection rate of 137,398 cps.

When handling 2K objects, the Coyote Point Equalizer E350si achieved almost a 50% higher connection rate than the F5 Networks BIG-IP 1500 — 31,996 cps for the Coyote Point device and 21,460 for the BIG-IP 1500. It is noteworthy that the higher-end BIG-IP 3400 offered a connection rate that

was about 27% greater than the E350si, (at a cost that is more than four times higher than the Coyote Point product).

With large object sizes of 16K, the Coyote Point Equalizer E350si delivered 5,518 cps, or 62% more than the BIG-IP 1500. The performance gap

**Coyote Point
Systems, Inc.**

Equalizer E350si

**Layer 4
Connection Rate,
Layer 7**

Transaction Rate and Throughput



Coyote Point Systems, Inc. Equalizer E350si Product Specifications*

Connectivity

- One 1000base-T Ethernet (external)
- Eight 100base-T Ethernet (internal)

Load-balancing algorithms supported

- Adaptive
- Weighted server latency
- Weighted least connections
- Round robin
- Least connections
- Server agent

Persistence methods

- Cookie insertion
- Sticky connections

Server failure detection

- Full system-level redundancy supported

- Heartbeats over all attached interfaces

Management

- Secure Web-based management
- Serial and SSH command line
- SNMP

Reporting

- Graphical reporting tools included
- Real-time reporting of all system metrics

Support

- One-year 8x5 phone/email support included
- 24x7 support available
- One-year hardware warranty included

For more information contact:

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URL:

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**Vendor-supplied information not verified by The Tolly Group*

Layer 4 Price/Performance Analysis of Equalizer E350si vs. BIG-IP 1500/3400

Model (MSRP)	Object size	Connections/sec	Cost per cps (US\$)	Throughput (Mbps)	Cost per Mbps (US\$)
Coyote Point E350si (US\$5,995)	64	78,885	0.08	468.6	12.79
	2K	31,996	0.19	701.7	8.54
	16K	5,518	1.09	777.8	7.71
F5 Networks BIG-IP 1500 (US\$15,995)	64	34,156	0.47	210.5	75.99
	2K	21,460	0.75	475.1	33.67
	16K	3,413	4.69	481.9	33.19
F5 Networks BIG-IP 3400 (US\$25,995)	64	137,398	0.19	811.5	32.03
	2K	40,753	0.64	893.5	29.09
	16K	6,599	3.94	930.4	27.94

Note: All BIG-IP prices are MSRP supplied by F5 during acquisition of the F5 gear by Coyote Point.

Source: The Tolly Group, September 2005

Figure 3

between the E350si and the BIG-IP 3400 narrowed with the BIG-IP 3400 outperforming by 16% more.

Throughput rates tell an intriguing story, too. The Coyote Point Equalizer E350si achieved 469 Mbps of throughput with 64-byte objects, which was more than twice the throughput of the BIG-IP 1500 (210.5 Mbps). With 2K-byte objects, throughput of the Equalizer E350si jumps to 702 Mbps, or about 48% more than the BIG-IP 1500's 475 Mbps. Further, the Equalizer E350si throughput at 2K-byte objects is just 21% less than the BIG-IP 3400.

Finally, at large object sizes of 16K-bytes, the Equalizer E350si achieved throughput of 778 Mbps. The BIG-IP 1500 and BIG-IP 3400 were able to achieve throughput of 482 Mbps and 930 Mbps respectively, which approximated throughput delivered with 2K-

byte objects. For larger object sizes, the E350si throughput continued to improve while both BIG-IP systems showed negligible increases.

LAYER 7 PERFORMANCE

Tolly Group engineers measured the steady-state transaction-per-second rate and throughput performance for Layer 7 switching with respect to the different object sizes tested — 64 bytes, 2K bytes and 16K bytes. In these tests, like the Layer 4 test, Coyote Point's E350si consistently outperformed the BIG-IP 1500 and narrowed the gap with the BIG-IP 3400 as the object size increased.

Tests for 64-byte objects show that the Coyote Point Equalizer E350si supported 44,375 transactions per second (tps), or 30% more than the BIG-IP 1500 (34,199 tps). The Equalizer

E350si achieved a transaction rate that is about half of the tps rate for the BIG-IP 3400, yet the Equalizer E350si costs nearly one-fourth the price of F5 Networks larger device.

The Equalizer E350si also delivered about 30% more tps at the 2K-byte object size — 30,972 tps for the E350si versus 23,881 for the BIG-IP 1500. Interestingly, the more expensive BIG-IP 3400 delivered about 33% more tps than the Equalizer E350si.

At the 16K-byte object size, the Equalizer E350si delivered 5,222 tps, or 50% more transaction than the BIG-IP 1500, which achieved a rate of 3,477 tps. Moreover, the Equalizer E350si tps rate was only about 20% less than the 6,565 tps delivered by the larger BIG-IP 3400.

When measuring performance, the Equalizer E350si's through-

Layer 7 Price/Performance Analysis of Equalizer E350si vs. BIG-IP 1500/3400

Model (MSRP)	Object size	Transactions/sec	Cost per tps (US\$)	Throughput (Mbps)	Cost per Mbps (US\$)
E350si (US\$5,995)	64	44,375	0.14	198.6	30.19
	2K	30,972	0.19	633.2	9.47
	16K	5,222	1.15	728.8	8.23
F5 Networks BIG-IP 1500 (US\$15,995)	64	34,199	0.47	151.1	105.86
	2K	23,881	0.67	486.8	32.86
	16K	3,477	4.60	484.8	32.99
F5-3400 (US\$25,995)	64	88,612	0.29	391.5	66.40
	2K	45,923	0.57	936.2	27.77
	16K	6,565	3.96	915.3	28.40

Note: All BIG-IP prices are MSRP supplied by F5 during acquisition of the F5 gear by Coyote Point.

Source: The Tolly Group, September 2005

Figure 4

put increased as each packet size was tested. The Equalizer E350si delivered throughput of 199 Mbps when tested at 64-byte objects, 633 Mbps at 2K-byte objects, and 729 Mbps when tested at 16K-byte objects. Those throughput results ranged from 31% to 50% higher than the throughput delivered by the BIG-IP 1500.

More importantly while throughput continued to climb for the Equalizer E350si, it actually leveled off around 480 Mbps and 930 Mbps on the BIG-IP 1500 and BIG-IP 3400 respectively between the 2K-byte and 16K-byte object tests.

PRICE/PERFORMANCE

Performance is vitally important when it comes to Layer 4 and Layer 7 connection and transaction rates, but cost is important too. The context of price needs to be factored into any deployment decision. Two price/per-

formance metrics for Layer 4 and Layer 7 to consider are cost per connection rate and cost per throughput capacity.

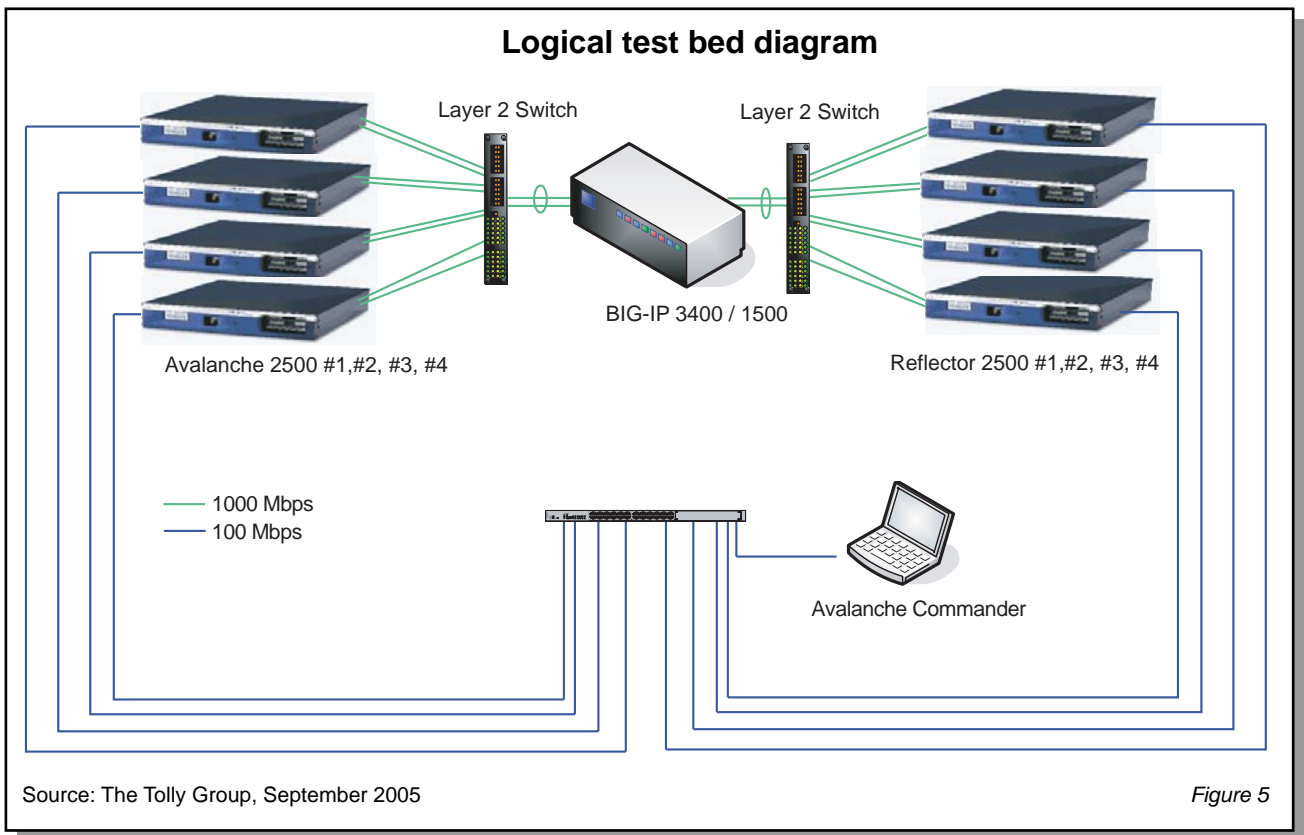
With an MSRP price of \$5,995, Coyote Point's Equalizer E350si delivers a price/performance as low as eight cents per connection, when tested at 64-byte objects in Layer 4 tests. By contrast, the F5 Networks BIG-IP 1500 with an MSRP price of \$15,995, has a cost per connection that ranges from a low of 47 cents (64-byte objects) to a high of \$4.69 (16K-byte objects).

Users also can use the cost-per-Mbps of throughput to compare competing solutions. The Equalizer E350si offers an average throughput of 520 Mbps across the three object sizes tested at Layer 4; that equates to a cost-per-Mbps of \$9.70. By contrast, the BIG-IP 1500 offers average throughput of 374 Mbps across the three object

sizes tested, which equates to a cost-per-Mbps of \$47.61. That means the Equalizer E350si delivers throughput at a cost nearly five times less than the BIG-IP 1500. Users pay more for a device that yields less throughput than the Equalizer E350si.

Layer 7 test results tell a similar price/performance story. An examination of the device transaction rates, vis a vis the overall device cost, shows that the Equalizer E350si delivers a price/performance as low as 14 cents per transaction when tested with the 64-byte object size. By contrast, the BIG-IP 1500 offers a cost per transaction that starts at 47 cents for 64-byte objects and rises to \$4.60 per transaction for 16K-byte objects.

The Layer 7 cost-per-Mbps also significantly favors the Equalizer E350si. Analysis shows that the Equalizer E350si



offers a cost-per-Mbps ranging from \$8.22 to \$30.13, which is four times less than either the BIG-IP 1500 or BIG-IP 3400.

In the end, the Equalizer E350si delivers greater value, providing greater performance at less cost than either of the F5 BIG-IP products tested. And, while the BIG-IP 3400 offered greater performance, analysis shows the Equalizer E350si exceeds the larger F5 device, in terms of the price/performance delivered.

EASE OF USE

Hands-on testing of the Equalizer E350si reveals a device that offers a very simple, intuitive and secured way of configuring the load balancer while supporting all key features. Engineers observed streamlined configuration processes ranging from server

cluster setup, to the more detailed creation of match rules that affect traffic policy. By contrast, the F5 BIG-IP 3400 and BIG-IP 1500 offer additional features making setup and management more complex than the Equalizer E350si. In most real-world network deployments, network administrators do not necessarily need these additional features. It is important for administrators to review their traffic management requirements to judge which features have practical value.

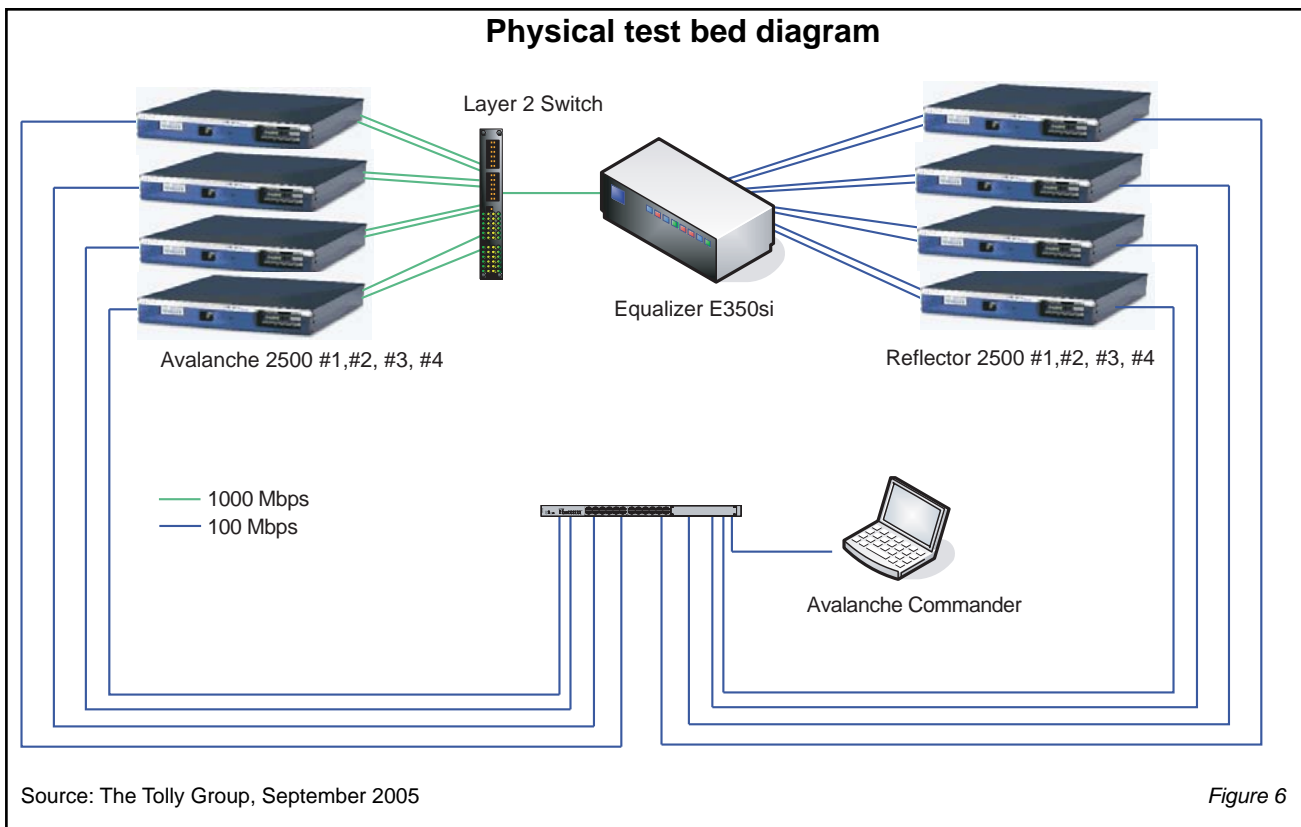
TEST CONFIGURATION AND METHODOLOGY

For performance tests, The Tolly Group tested a Coyote Point Systems Equalizer E350si application traffic management switch running software version 7.2.0d and F5 Networks BIG-IP

1500 and BIG-IP 3400 application traffic management switches running software version 9.1.0 Build 6.2.

The Layer 4 test bed consisted of eight (8) emulated backend HTTP servers connected directly to the eight server ports on E350si or via a wire-speed Layer 2 switch for BIG-IP 1500 and BIG-IP 3400. The Layer 2 Gigabit Ethernet switch was connected to the server side of the BIG-IP 3400 and 1500 via two Gigabit Ethernet ports as a trunk, as recommended by engineers from F5.

HTTP clients connected to the external interface(s) via wire-speed Layer 2 switch. The Layer 2 switch was connected to the client side of the E350si via one Gigabit Ethernet (GbE) port and the client side of the



BIG-IP 3400 and 1500 via two GbE ports as a trunk. HTTP/1.1 (with persistence) was supported, and engineers utilized object sizes of 64, 2K, and 16K bytes. The connections were closed by reset. Cookie-based persistence was enabled for all devices.

For the Layer 4 connection rate tests, engineers generated real HTTP/1.1 traffic. Both the Spirent Avalanche and Reflector acted as multiple clients and servers for the test. Engineers set up both the Avalanche 2500C and the Reflector 2500C and also configured the Equalizer E350si (and subsequently the F5 Networks devices) for Layer 4 switching. Engineers configured the Avalanche Commander for the appropriate object size, load profile, test subnet and test duration. Next, they ran the test

and recorded the results.

Engineers continued by changing the load profile to tune or the maximum values without a failed transaction for five-minute duration and changed the URL list to request for the different size of data from the Reflector. Engineers then re-ran the test.

For the Layer 7 performance tests, engineers measured the transaction per second rate of each of the tested devices.

The Layer 7 test bed consisted of eight emulated backend HTTP servers connected to the internal interface(s) in the same way as the Layer 4 test. For Layer 7 URL switching, testers configured each device under test to classify the traffic by URL suffix (e.g. ".htm" and ".gif") and send the ".htm"

requests to the odd-numbered servers and the "gif" requests to the even-numbered servers. HTTP clients connected to the external interface(s) in the same way as the Layer 4 test. HTTP/1.1 (with persistence) was supported, and engineers utilized object sizes of 64, 2K, 16K bytes. Up to eight transactions were supported on each connection. The connections were closed by reset.

EQUIPMENT ACQUISITION AND SUPPORT

The F5 Networks BIG-IP 1500 and BIG-IP 3400 devices tested for this report were acquired by Coyote Point through normal product distribution channels. The Tolly Group contacted representatives at F5 Networks in

August 2005 and invited them to provide a higher level of support than available through normal channels. In early September 2005, F5 Networks supplied a software update and device configuration files for the BIG-IP devices. The Tolly

Group supplied F5 Networks with test results for the BIG-IP products tested and F5 neither confirmed nor disputed the accuracy of the results.



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

Vendor	Product	Web address
Spirent Communications	Reflector 2500C Ver 7.0	http://www.spirentcom.com
Spirent Communications	Avalanche 2500C Ver 7.0	http://www.spirentcom.com
Spirent Communications	Avalanche Commander Ver 7.0	http://www.spirentcom.com

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PROJECT PROFILE

Sponsor: Coyote Point Systems, Inc.

Document number: 205131

Product class: Layer 4-7 switch

Products under test:

- Coyote Point Equalizer E350si SW Ver 7.2.0d
- F5 Networks BIG-IP 1500 SW Ver 9.1.0 Build 6.2

- F5 Networks BIG-IP 3400 SW Ver 9.1.0 Build 6.2

Testing window: September 2005

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