The Business Case for NeuStar's UltraDNS Traffic Controller Service

Network Strategy Partners, LLC

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Executive Summary

Web Services provide enterprises with improved productivity, reliability, and increased profitability—and can even foster new business opportunities. Ensuring that these essential network infrastructure components remain available—and the traffic to them uninterrupted—requires a global server load balancing (GSLB) system that dynamically routes network traffic to the right resources and locations in the event of network congestion or failure.

The UltraDNS Traffic Controller Service provides high performance, high-availability, globally managed dynamic load balancing, monitoring, and failure recovery. It continuously monitors an enterprise's Web servers and directs traffic to optimal locations based on:

- Geographic location
- Server availability
- Server loads

The key benefits of Traffic Controller include:

- Reliability of the high performance, high-availability UltraDNS global network
- No hardware or software requirements
- Quick and seamless implementation
- Integration with NeuStar's UltraDNS service
- 24x7x365 UltraDNS expert support

This study compares the Total Cost of Ownership (TCO) of the UltraDNS Traffic Controller Service with the TCO of an enterprise-owned and operated solution. Our study compared capital and operations expenses for large, medium, and small enterprise networks, and in all cases the NeuStar managed service is significantly more cost-effective than an enterprise-owned and operated service (Table 1 presents a summary of these results). Bottom line, it is fundamentally less expensive to share a scalable, GSLB among multiple enterprises than to build separate DNS load balancing systems for each enterprise.

	NeuStar 3-Year Cumulative TCO	Enterprise-owned Load Balancer 3-Year Cumulative TCO	Cost Difference
Large Network	$162,590	$787,828	485%
Medium Network	$118,002	$341,518	289%
Small Network	$44,875	$118,890	265%

Table 1
3 year cumulative TCO comparison between the UltraDNS Traffic Controller Service and the Enterprise-Owned and Operated Service

The following sections of this paper present:

1. Traffic Controller Service Overview
2. Overview of Enterprise-Owned Global Load Balancing Solution
3. A TCO Comparison of the UltraDNS Traffic Controller Service with the Enterprise-Owned and Operated System
4. Results of TCO Analysis

UltraDNS Traffic Controller Service Overview

NeuStar built the UltraDNS Traffic Controller Service on the global directory services platform at the core of NeuStar's UltraDNS Managed DNS Service, which provides a carrier-class DNS infrastructure for over 30 million Internet domains.

The Traffic Controller Service allows administrators to define load balancing configurations for web/content servers that reside in one or more geographic locations. It manages traffic directed to servers and data centers by dynamically changing responses to DNS requests. Traffic Controller performs load balancing using dynamic metrics obtained through the constant monitoring of host servers.

Our Traffic Controller Service leverages SiteBacker, NeuStar's UltraDNS monitoring and failover service, which supports critical websites around the world. SiteBacker's monitoring probes measure the responsiveness of designated web/application servers. Traffic Controller dynamically modifies the weight factors in DNS to redirect traffic to more responsive servers by using the probe results.

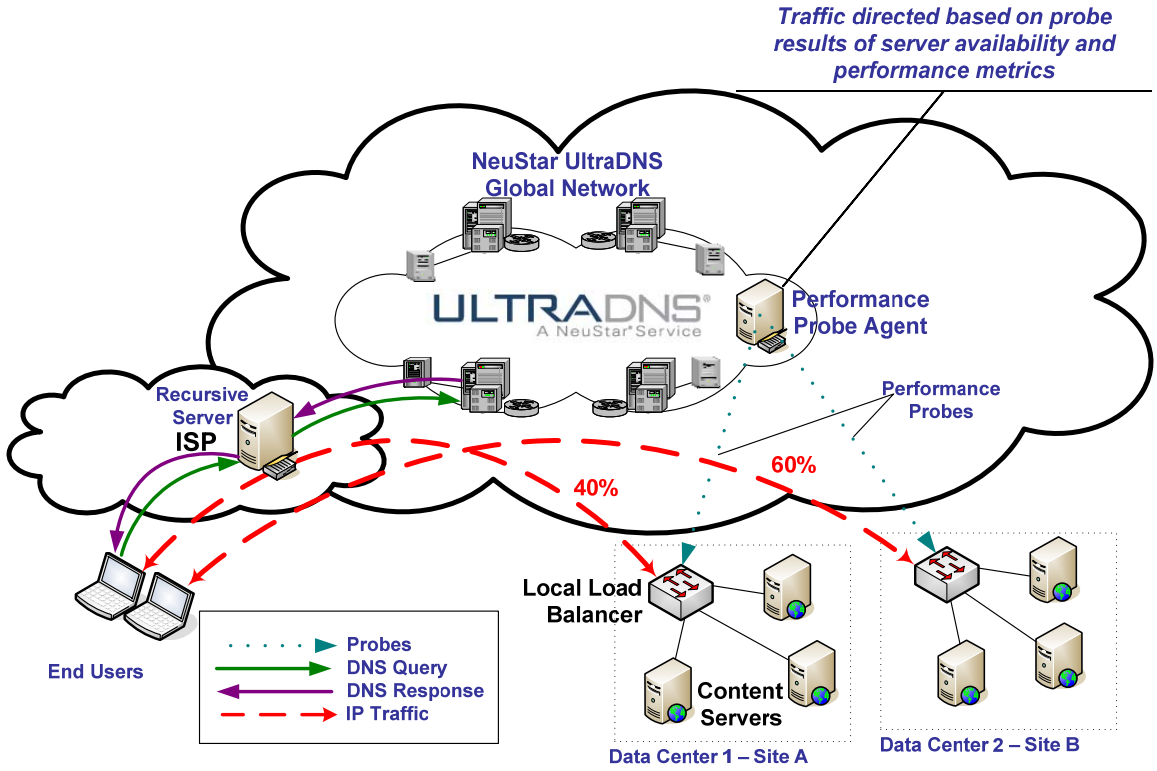

Figure 1
UltraDNS Traffic Controller Service

Traffic Controller can be an enterprise's sole load balancing service or it can complement an existing, in-house load balancing solution—thus extending the enterprise's global reach without additional hardware investment.

Overview of Enterprise-Owned Global Load Balancing Solution

The alternative approach to the Traffic Controller Service is an enterprise-owned and operated system that uses redundant load balancers in each data center. These devices monitor web servers in distributed data centers and optimize traffic routing using DNS. Traffic management rules consider the health of network servers, relative server loads, and rules for weighted round-robin Quality of Service (QoS). The functionality of the enterprise-owned solution is similar to the UltraDNS Traffic Controller Service; however, the enterprise is responsible for purchasing, operating, and maintaining global load balancing systems.

There are two types of load balancers: Global Server Load Balancers (GSLB) and Local Load Balancers (see Figure 2). Local load balancers typically perform multiple network functions including:

- Web load balancing between multiple servers
- Application acceleration

- Protocol optimization and acceleration
- WAN optimization
- Network security
- Content spooling and buffering
- Caching

These functions solely focus on optimizing access to servers inside the data center and, therefore, local load balancers need to be co-located in the data center.

GSLB focuses on a different problem: routing optimization of global web traffic to servers located in multiple geographically dispersed data centers. These servers carry out functions similar to the UltraDNS Traffic Controller Service:

- Monitor the performance and health of the global network including servers and applications
- Make DNS routing decisions to optimally distribute demand among data centers
- Implement disaster recovery through DNS rerouting

The functions of local load balancing and global server load balancing are very different and predictable performance is essential for both systems. Therefore it is a best practice to use dedicated servers for both global load balancing and local load balancing. High availability is also a critical requirement for global server load balancing; therefore, a pair of redundant load balancers is required in each data center.

If an enterprise implements its own GSLB, then the IT staff is responsible for operations and maintenance of these systems 24x7x365. This includes system provisioning and administration, performance monitoring, fault monitoring, software patch and upgrade management, vendor management, and additional training. In our TCO analysis, we show that enterprises can avoid the significant costs associated with these and other critical tasks by using a managed service.

Another salient feature of the enterprise-owned system is that it is necessary to buy all the hardware and software for the solution on day one regardless of the global DNS load being processed. In contrast, the NeuStar service allows users to scale from one record to hundreds of records using a pay-as-you go service model that is both a more scalable and more cost-effective approach to global server load balancing.

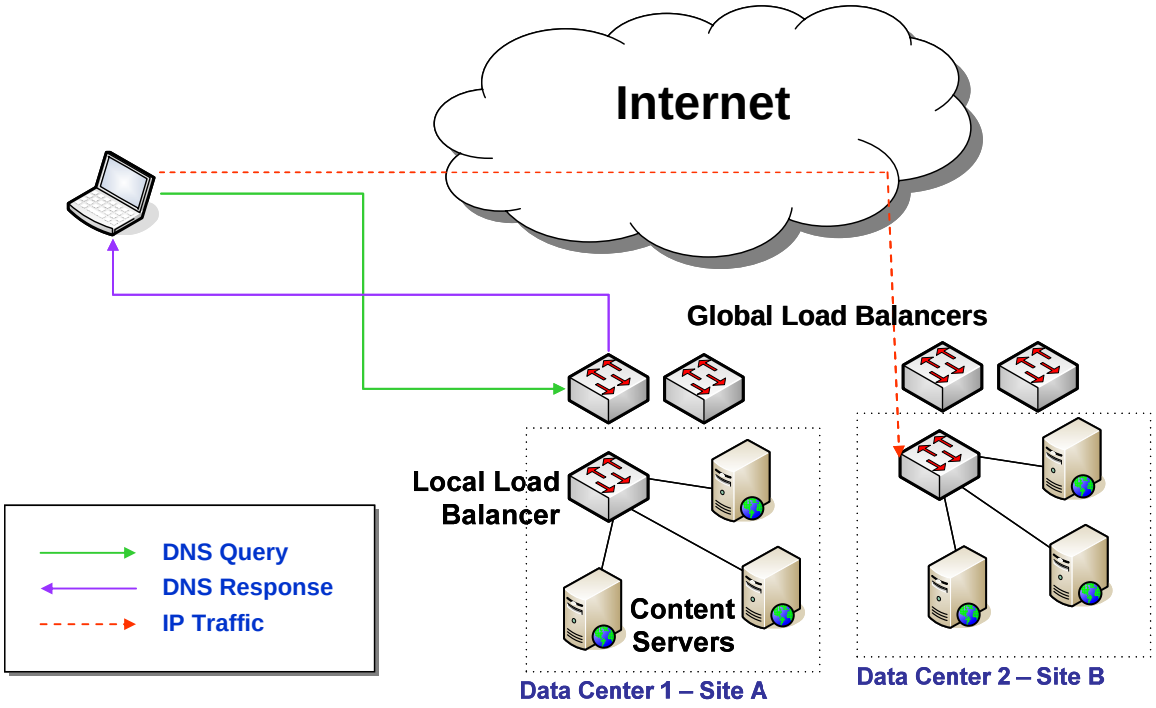

Figure 2
Enterprise-Owned and Operated DNS Load Balancers

The following sections of this paper show that the NeuStar managed service is significantly more cost-effective than the enterprise-owned and operated approach.

A TCO Comparison of the UltraDNS Traffic Controller Service with the Enterprise-Owned and Operated System

There are many benefits obtained by outsourcing global DNS traffic management and load balancing. They include:

- Rapid service implementation time
- A global, scalable, high performance DNS network
- A high availability solution
- 24x7x365 support

In addition to these benefits, the Total Cost of Ownership (TCO) of the UltraDNS Traffic Controller Service is significantly lower than the TCO of an enterprise-owned and operated solution.

The TCO analysis compares the managed service with the enterprise-owned solution for three scenarios:

1. A Large Enterprise Customer
2. A Medium Enterprise Customer

3. A Small Enterprise Customer

The following sections of this paper present the assumptions and results generated by the TCO model.

UltraDNS Traffic Controller Service Assumptions

Enterprises incur two types of expenses when outsourcing GSLB to NeuStar:

1. NeuStar monthly service charges based on the enterprises utilization of the UltraDNS Managed DNS and Traffic Controller Services.
2. Enterprise labor costs required to administer the services.

This study uses assumptions based on data obtained from current NeuStar customers to determine the dimensions of Traffic Controller. Table 2, Table 3, and Table 4 present the service dimensions for large, medium, and small networks, respectively.

Service Dimension	Year 1	Year 2	Year 3
Domains	500	515	530
Resource Records	1,000	1,030	1,061
DNS Queries (per Month)	100,000,000	108,000,000	116,640,000
Traffic Manager Resource Records	25	26	27

Table 2
UltraDNS Traffic Controller Service Dimensions for a Large Enterprise Network

Service Dimension	Year 1	Year 2	Year 3
Domains	100	103	106
Resource Records	200	206	212
DNS Queries (per Month)	20,000,000	21,600,000	23,328,000
Traffic Manager Resource Records	10	10	11

Table 3
UltraDNS Traffic Controller Service Dimensions for a Medium Enterprise Network

Service Dimension	Year 1	Year 2	Year 3
Domains	5	5	5
Resource Records	15	15	16
DNS Queries (per Month)	500,000	540,000	583,200
Traffic Manager Resource Records	2	2	2

Table 4
UltraDNS Traffic Controller Service Dimensions for a Small Enterprise Network

The second NeuStar expense category is the internal cost to an enterprise IT department to administer the services. For large networks, this study assumes a two-hour-per-week administration requirement, and for medium and small networks, a one-hour-per week administration requirement. The assumption for the fully-loaded cost of an FTE to administer the service is $100 per hour.

Assumptions for an Enterprise-Owned and Operated System

An internal enterprise global load balancing solution includes both capital and operating expenses. Capital expenses include the cost of load balancing hardware and software. Operations expenses are on-going annual expenses.

Large and medium network assumptions:

- Three data centers with two (redundant) global load balancing servers in each data center.
- High-end load balancers

Small network assumptions:

- One data center with two (redundant) global load balancers.
- Smaller load-balancers

Table 5 presents the operations expense categories and fundamental assumptions used to calculate Operations Expenses.

Operations Expense	Definitions and Assumptions
Network Upgrades & Patches	This includes both hardware and software upgrades to the global load balancing servers. Two hours are required to upgrade each chassis and there are four upgrades per year.
Network Care	This includes network provisioning, surveillance, monitoring, data collection, maintenance, and fault isolation associated with managing the load balancing servers. Ten hours per chassis per year of a technician's time is required and 50 hours per chassis per year of an engineer's time is required to manage the system.
Training	Training expenses are required initially and on an on-going basis. 20 hours of training is required for a technician and 40 hours of training is required for an engineer in year 1. On-going training expenses are assumed 25% of year 1 expenses.
Service Contracts	These are vendor service contracts required for on-going support of network equipment. Service contracts are 15% of capital expenses.
Floor Space Cost	These costs are associated with the floor space cost/square meter in the Data Center. These costs are calculated based on the space required for the servers.
Power Cost	This is the electric utility bill to power the servers.
Cooling Cost	This is the cost of the HVAC system to cool the servers.

Table 5
Categories of Operations Expenses for the Enterprise-Owned and Operation Global Load Balancing System

This study calculated operations expenses by estimating the hours that an FTE needs to spend supporting the system. FTE hours are calculated for technicians and engineers. Table 6 specifies the assumptions for fully-loaded labor rates.

FTE Level	Fully Loaded Labor Rate
Technician	$50 per hour
Engineer	$100 per hour

Table 6
Fully Loaded Labor Rates for Technicians and Engineers

Results of TCO Analysis

For each of the three scenarios considered (large, medium, and small networks), the TCO analysis shows that the UltraDNS Traffic Controller Service provides a significant cost savings over the enterprise-owned and operated global load balancing system.

Results for Large Network Scenario

Table 7 presents detailed results for the large network scenario. The top table shows the operations expenses for the UltraDNS Traffic Controller Service over a three-year period and the lower table presents the operating expenses for an enterprise-owned and operated load balancing system over the same three-year period. The Traffic Controller Service operating expenses consist of 1) the annual service fees and 2) the internal administration expenses for an FTE responsible for managing the UltraDNS services. The enterprise-owned expenses consist of the capital costs for acquiring equipment and the on-going operations expenses described in detail in the previous section.

TCO of Neustar Traffic Controller Service

Neustar Service and Operations Expenses	Year 1	Year 2	Year 3
Neustar Service Expenses	$ 41,400	$ 43,542	$ 45,820
Enterprise Internal Neustar Administration Expenses	$ 10,400	$ 10,608	$ 10,820
Annual Expenses	**$ 51,800**	**$ 54,150**	**$ 56,640**
Cumulative Expenses	**$ 51,800**	**$ 105,950**	**$ 162,590**

TCO of Enterprise Owned and Operated DNS and Load Balancing Servers

Internal Capital and Operating Expenses	Year 1	Year 2	Year 3
Capital Expenses			
DNS Global Load Balancing Servers	$ 448,200	$ -	$ -
Annual Capital Expenses	$ 448,200	$ -	$ -
Operations Expenses			
Network Upgrades & Patches	$ 4,800	$ 4,896	$ 4,994
Network Care	$ 33,000	$ 33,660	$ 34,333
Training	$ 5,000	$ 1,275	$ 1,301
Service Contracts	$ 67,230	$ 67,230	$ 67,230
Floor Space Cost	$ 628	$ 628	$ 628
Power Cost	$ 1,577	$ 1,577	$ 1,577
Cooling Cost	$ 2,688	$ 2,688	$ 2,688
Annual Operations Expenses	$ 114,923	$ 111,954	$ 112,751
TCO (Captial Expenses + Operations Expenses)			
Total Cost of Ownership (TCO)	**$ 563,123**	**$ 111,954**	**$ 112,751**
Cumulative TCO	**$ 563,123**	**$ 675,077**	**$ 787,828**

Table 7
TCO Detail Comparison of UltraDNS Traffic Controller Service with Enterprise-Owned and Operation Load Balancing Service for the Large Network Scenario

Figure 3 presents a summary chart comparing the cumulative TCO over the three-year period. This chart shows that the NeuStar service is significantly more cost-effective than the enterprise-owned alternative.

If one considers the NeuStar service to be an investment and treats the cost savings resulting from *not* deploying an enterprise-owned system as financial benefits, then we can easily calculate the Internal Rate of Return (IRR) and Net Present Value (NPV) of the investment. The large network scenario produces an IRR of 998% and an NPV of

$615,793. This high IRR and large NPV demonstrate the financial benefits of using a managed service for global server load balancing.

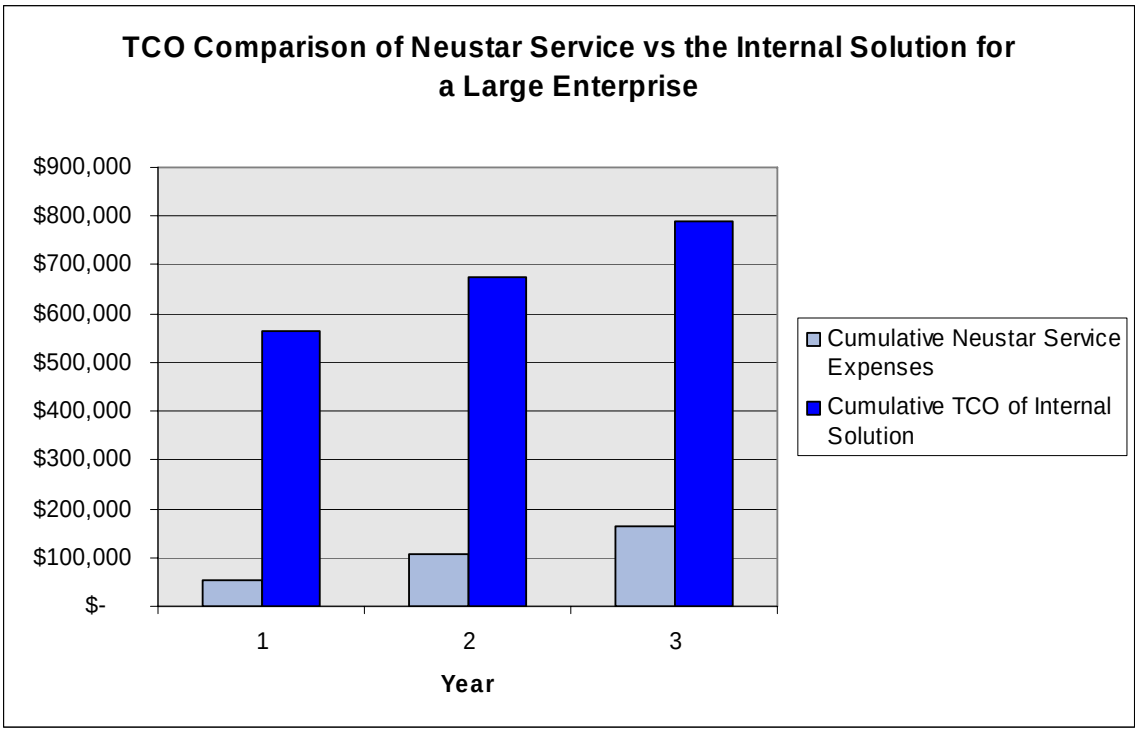

Figure 3
Cumulative TCO Comparison of UltraDNS Traffic Controller Service with an Enterprise-Owned System for the Large Network Scenario

Results for Medium Network Scenario

Table 8 and Figure 4 present the results for the medium network scenario. These results show that the Traffic Controller Service is also more cost-effective for a medium size network. In this scenario the study assumed that the enterprise-owned and operated system uses smaller controllers that result in lower capital expenses and lower service contract expenses. However, these savings are not enough to justify the enterprise-owned alternative because the NeuStar service charges are proportional to the size of the DNS network. Thus, the NeuStar service is less expensive in this scenario resulting in a lower cumulative TCO. The analysis shows that the IRR for this scenario is 472% and the NPV is $219,225 providing a positive return on the NeuStar investment.

TCO of Neustar Traffic Controller Service

Neustar Service and Operations Expenses	Year 1	Year 2	Year 3
Neustar Service Expenses	$ 32,304	$ 33,993	$ 35,791
Enterprise Internal Neustar Administration Expenses	$ 5,200	$ 5,304	$ 5,410
Annual Expenses	**$ 37,504**	**$ 39,297**	**$ 41,201**
Cumulative Expenses	**$ 37,504**	**$ 76,801**	**$ 118,002**

TCO of Enterprise Owned and Operated DNS and Load Balancing Servers

Internal Capital and Operating Expenses	Year 1	Year 2	Year 3
Capital Expenses			
DNS Global Load Balancing Servers	$ 140,400	$ -	$ -
Annual Capital Expenses	$ 140,400	$ -	$ -
Operations Expenses			
Network Upgrades & Patches	$ 4,800	$ 4,896	$ 4,994
Network Care	$ 33,000	$ 33,660	$ 34,333
Training	$ 5,000	$ 1,275	$ 1,301
Service Contracts	$ 21,060	$ 21,060	$ 21,060
Floor Space Cost	$ 628	$ 628	$ 628
Power Cost	$ 1,577	$ 1,577	$ 1,577
Cooling Cost	$ 2,688	$ 2,688	$ 2,688
Annual Operations Expenses	$ 68,753	$ 65,784	$ 66,581
TCO (Captial Expenses + Operations Expenses)			
Total Cost of Ownership (TCO)	**$ 209,153**	**$ 65,784**	**$ 66,581**
Cumulative TCO	**$ 209,153**	**$ 274,937**	**$ 341,518**

Table 8
TCO Detail Comparison of UltraDNS Traffic Controller Service with Enterprise-Owned and Operation Load Balancing Service for the Medium Network Scenario

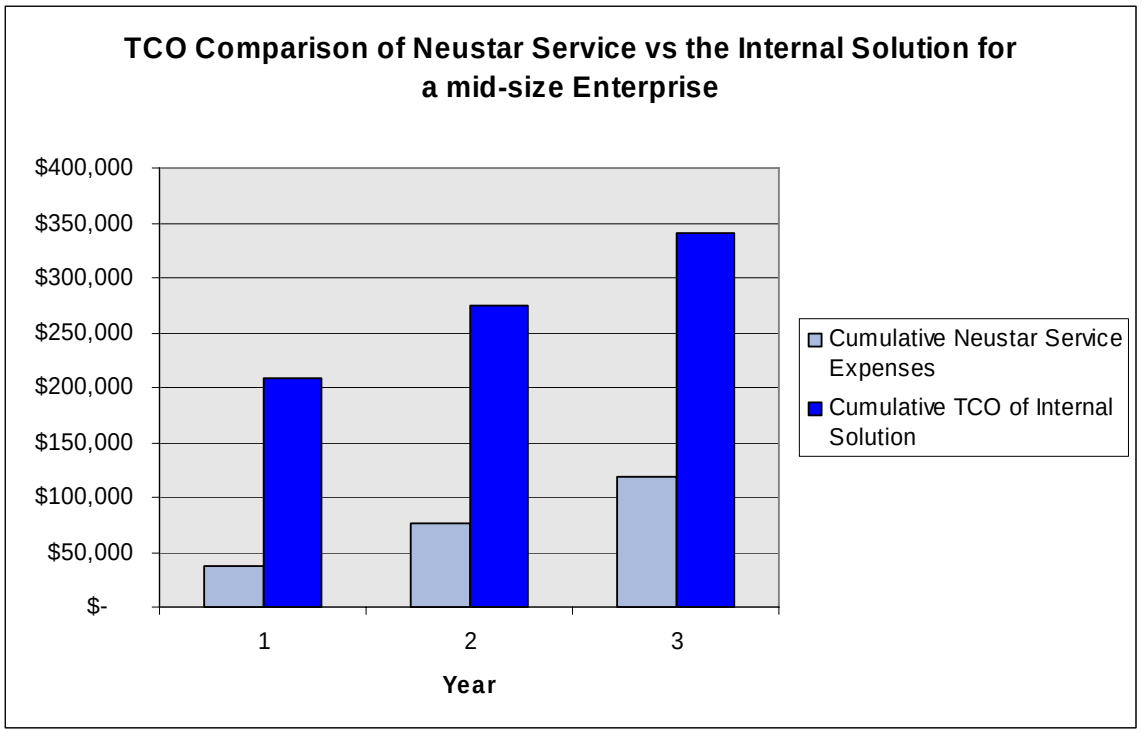

Figure 4
Cumulative TCO Comparison of UltraDNS Traffic Controller Service with an Enterprise-Owned System for the Medium Network Scenario

Results for Small Network Scenario

Table 9 and Figure 5 compare the detailed results and cumulative TCO for the small network scenario. In this network the capital expense of purchasing load balancers for the enterprise-owned alternative is less expensive because the data center requires only two small controllers. However, the Traffic Controller Service still proves to be more cost-effective for this scenario. The IRR for the NeuStar investment in the small network scenario is 419% and the NPV is $72,739 proving the NeuStar choice to be a sound financial decision.

TCO of Neustar Traffic Controller Service

Neustar Service and Operations Expenses	Year 1	Year 2	Year 3
Neustar Service Expenses	$ 9,234	$ 9,646	$ 10,081
Enterprise Internal Neustar Administration Expenses	$ 5,200	$ 5,304	$ 5,410
Annual Expenses	**$ 14,434**	**$ 14,950**	**$ 15,491**
Cumulative Expenses	**$ 14,434**	**$ 29,384**	**$ 44,875**

TCO of Enterprise Owned and Operated DNS and Load Balancing Servers

Internal Capital and Operating Expenses	Year 1	Year 2	Year 3
Capital Expenses			
DNS Global Load Balancing Servers	$ 46,800	$ -	$ -
Annual Capital Expenses	$ 46,800	$ -	$ -
Operations Expenses			
Network Upgrades & Patches	$ 1,600	$ 1,632	$ 1,665
Network Care	$ 11,000	$ 11,220	$ 11,444
Training	$ 5,000	$ 1,275	$ 1,301
Service Contracts	$ 7,020	$ 7,020	$ 7,020
Floor Space Cost	$ 209	$ 209	$ 209
Power Cost	$ 526	$ 526	$ 526
Cooling Cost	$ 896	$ 896	$ 896
Annual Operations Expenses	$ 26,251	$ 22,778	$ 23,061
TCO (Captial Expenses + Operations Expenses)			
Total Cost of Ownership (TCO)	**$ 73,051**	**$ 22,778**	**$ 23,061**
Cumulative TCO	**$ 73,051**	**$ 95,829**	**$ 118,890**

Table 9
TCO Detail Comparison of UltraDNS Traffic Controller Service with Enterprise-Owned and Operation Load Balancing Service for the Small Network Scenario

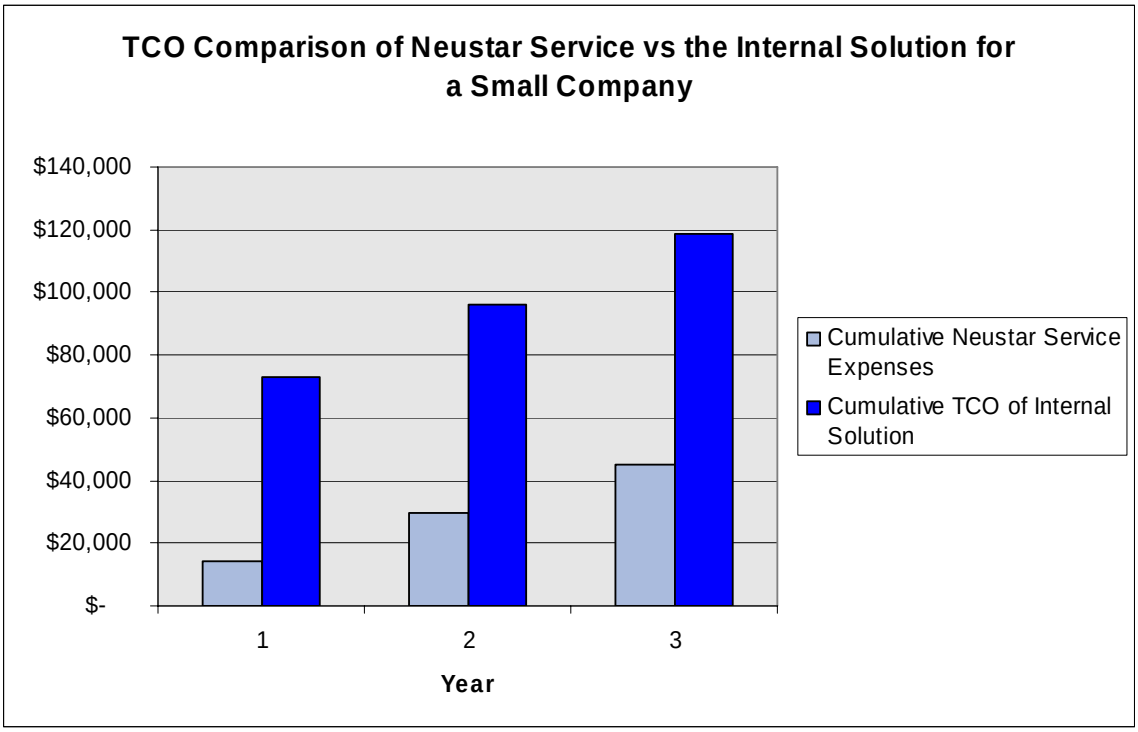

Figure 5
Cumulative TCO Comparison of UltraDNS Traffic Controller Service with an Enterprise-Owned System for the Small Network Scenario

Conclusion

An enterprise IT organization has two main alternatives to implement global server load balancing:

1. Use a global server load balancing managed service
2. Implement an internally owned and operated load balancing system

If an enterprise chooses to own and operate their own global load balancing system, then the IT department is solely responsible for implementing and operating that system. The enterprise must purchase redundant servers on day one for all data centers, IT staff must incur training costs to operate the servers, and they must provide 24x7x365 service. Reliable DNS operation is a critical business function with no room for compromise. This alternative requires a significant up-front capital investment as well as on-going operations expenses, including system administration, fault and performance management, vendor software maintenance expenses, and environmental expenses. An enterprise-owned system also takes significant time to rollout. A realistic rollout schedule should include the time for system procurement, test, and cutover to production.

Alternatively, an enterprise could use NeuStar's UltraDNS Traffic Controller Service that leverages a global, high performance, high availability DNS network to provide a global server load balancing solution. Using this service, the enterprise can pay as it goes for load balancing services and leverage the 24x7x365 support operation that NeuStar has in place today. As we have demonstrated in this paper, the NeuStar solution is more cost-effective than an enterprise-owned and operated solution for networks of any size. Fundamentally this is because the NeuStar network is shared among multiple enterprise customers and, therefore, is a more scalable and cost-effective solution than building multiple separate networks for each enterprise.