Executive Summary

Current industry studies indicate that a bi-modal strategy of private and public clouds is used by enterprises for their cloud or datacenters. The spectrum covering the methodology for cloud-based application utilities ranges from enterprises setting up their own server farms to a transition period where they outsource some of their applications to a public cloud and then increase dependence on a public cloud.

For an enterprise, building/expanding its datacenters, consideration must be given to solutions that deliver high performance, resilient servers and datacenter (DC) switches, which are integrated and validated with existing datacenter ecosystems and offer platforms at competitive price points. More importantly, the solution must offer a single point of management that enables agility, visibility, rapid fault-mitigation and standard interfaces for network analytics, resource provisioning, and automation via DevOps.

ACG Research conducted an economic analysis of several leading vendors of DC switches for private datacenters. The analysis included the total cost of ownership for different DC switches over five years. Specifically, ACG analyzed Lenovo's DC switches for small/medium/large datacenters against two leading vendors. In all cases, the analysis showed return on investment (ROI) levels of 38% and 111%. More importantly, ACG Research found that operational expenditures using Lenovo's DC switches are 24% and 50% lower relative to those of the two leading vendors.

KEY FINDINGS

- Datacenter solutions must deliver high performance, resilient servers and top-of-rack switches, which are integrated and validated with existing data center ecosystems and offer solutions at competitive price points.

- ACG analyzed Lenovo's datacenter (DC) switches; Using typical enterprise datacenter scenarios, return on investment levels of 38% and 111% were obtained.

- ACG Research found that operational expenditures using Lenovo's DC switches are 24% and 50% lower relative to the two leading vendors.

Market Trends

Resiliency, availability of the right application(s), low latency and ease of management comprise some of the key technical requirements of an enterprise's cloud infrastructure strategy. A recent study by RightScale[1] reveals that a bi-modal or hybrid strategy is used by more than two-thirds of the enterprises that do use clouds (Figure 1)[2]. Enterprises set up, configure and manage their own private datacenter(s) (DC) in addition to using the IT services of a multi-tenant cloud operator that offers elastic compute, storage and network resources via a virtualized infrastructure.

Enterprises use these services to lower costs, reduce expensive skilled labor, and to utilize software-based applications. Enterprises also set up a datacenter of server farms to ensure that their own internal applications are accessed and used by their employees. These server farms include applications that are critical to the operational success of that enterprise: security solutions, resource planning systems, financial and payroll accounting solutions, and document management systems.
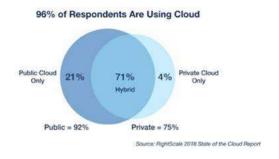

Figure 1. Market Trend in Enterprises Usage of Clouds

The current trend points to a decline in enterprises building their own private clouds in favor of publicly available cloud. The major reason for this trend is simple economics: paying for a public cloud seems like a lower cost approach and the Total Cost of Ownership (TCO) is reduced having the applications in the public cloud. However, with this approach enterprises may not have total control over their operations. In addition, the usage of SaaS can have issues. Figure 2 shows that latency and other issues directly impact employee productivity.

Figure 2. Current Issues in Office 365[3]

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[1] https://assets.rightscale.com/uploads/pdfs/RightScale-2017-State-of-the-Cloud-Report.pdf.

[2] Ibid.

[3] TechValidate and Zscaler. "Challenges with Office 365 Deployment" Survey. Q1 2017.

These problems can be rectified by building a private DC, but doing so only makes sense if the economics are competitive and the solution enables the IT team to manage the DC using agile methodologies (for example, DevOps) for its life cycle management (LCM). This is possible by employing a holistic, software-defined strategy whereby performance and automation are at the center of the datacenter infrastructure. Solutions should encompass an ecosystem of the right partners, hardware, software, and network management solution.

Private Cloud Requirement for Enterprises

An enterprise building or expanding its DC infrastructure needs to assess a vendor's solution on a holistic basis. The requires that the vendor deliver these requirements:

1. Full suite of high-performance servers and DC switches at competitive price points
2. Single point of management that enables the IT team to benefit from the points in Figure 2

Figure 3. Important Factors in Private DC LCM

Although the capital expenditure is an important factor in the TCO, the vendor's solution must offer the capability to optimize principles into the IT value system and enable building DevOps and continuous delivery into the organization.

The points in Figure 3 are critical as they impact the day-to-day operations of the enterprise. The private DC management must offer full visibility to ensure that the employees continue to be productive. The orchestrator must accelerate network automation and reduce time to repair for any network function, for example, automation of network operations, rapid resource allocation, to reduce operation expense (opex) and network downtime. Automated provisioning must also extend to virtual machines, and rapid fault-mitigation is necessary to ensure continuous high productivity in the enterprise. Monitoring events and alerts must be offered to reduce network downtime.

The current research studies on capital cost point to a significant increase in data traffic, mainly driven by video. Although the traffic continues to rise, IT budgets remain flat (Figure 4).
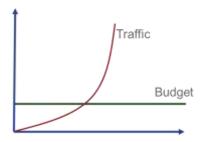
Figure 4. Increase in Traffic vs Enterprise IT Budget

Figure 4 shows that the IT team is forced to do more with less. As traffic increases, the hardware must also adapt, and port speeds must increase from 1G to 10G to 40G and 100G. The price drop in higher speed ports, specifically for 40G and 100G, is a major factor in the reduction of capital expense (capex) for servers and DC switches. The market is seeing an increased adoption of high-performance servers and DC switches having these high-speed ports. In addition, seamless transition from 10 and 40 Gigabit to 25 and 100 Gigabit Ethernet has become simple.

Economic Analysis of Lenovo's Data Center Switches

ACG Research conducted an economic analysis of Lenovo's DC switches relative to two leading vendors. We analyzed and compared Lenovo's capital (capex) and operational expenditure for a large enterprise. Two sets of leaf and spine switches were used in each case for comparison. For Lenovo, we used the following platforms:

1. 10G/25G leaf (10G for downlink connections and 40G for uplink) and 40G/100G spine switches using NE2572 and NE10032, respectively
2. 1G/10G leaf (1G for downlink connections and 10G for uplink) and 10G/40G spine using NE1072T and G8332

Competitors' platforms have the same I/O speeds as Lenovo's. We used Lenovo's SR 530s server in all cases.

Capex Calculation Variables
The capex calculation for both platforms included hardware (chassis, accessories where applicable, for example, interface ports). Average selling price levels were used for the competitors' platforms.

Opex Calculation Variables
Opex variables were the same for both and used the following to determine costs:
- Installation of equipment
- Upgrading (and testing the upgrade) of the software version, once a year + software patches and tests
- Network configuration/provisioning of services and testing (hours)
- Service monitoring and alerts
- Fault mitigation
- Power consumption

TCO Results
The DC dimensioning details were based on the following:

Scenario Assumptions: 5 Years	
Number of employees in Year 1	50,000
CAGR for employee increase	2%
Sustained bandwidth per employee in Year 1	500Kbps
CAGR for sustained bandwidth for Years 2–7	20%
Number of devices used in the enterprise	2x number of employees
Sustained bandwidth per device in Year 1	100Kbps
Average MAC address per device	1

Table 1. Assumptions for the Scenario under Analysis

The TCO based Return on Investment (ROI)[4] analysis was conducted over five years on both types of leaf and spine switches. The charts show the TCO advantages of the Lenovo's TCO.
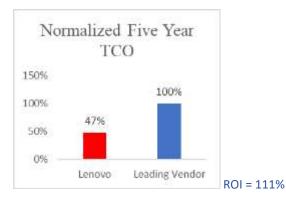

ROI = 111%

Figure 5. TCO Comparisons for the NE2572 and NE10032 vs. Leading Competitor
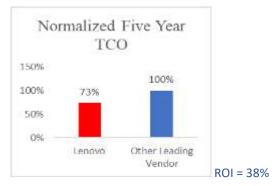

ROI = 38%

Figure 6. TCO Comparisons for the NE1072T & G8332 vs. Leading Competitor

Opex Calculations and Analysis

Figure 7. shows that Lenovo DC switches have lower opex over five years. Lenovo has a set of partners that enables IT teams to benefit from automation, fast provisioning, rapid time-to-repair with faster fault mitigation and faster resource provisioning.

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[4] Return of Investment (ROI) is used to evaluate the efficiency of two or more investments relative to each other. In this paper, the difference in the Total Cost of Ownership (TCO) is used to do this evaluation. Formula used is ((TCO$_{competition}$ − TCO$_{Lenovo}$)/TCO$_{Lenovo}$) * 100% over a five years.
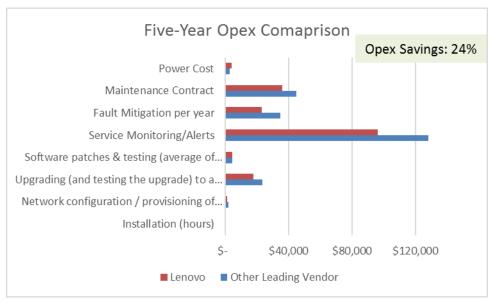
Figure 7. Opex Comparison

Lenovo's DC switches and server solutions for datacenters provide for the full spectrum for a datacenter strategy for various-sized enterprises and web-scalers. For enterprises, server farms can be built rapidly, economically and with a software-defined network management approach for automated provisioning and orchestration. These products also fit the establishment and expansion of web-scalers' datacenters.

Because enterprises, and specially web-scalers, rarely build all their infrastructure with the same vendor, it is essential that the solution they select is also interoperable with other vendors' products in the same space. This is the case for Lenovo's products. Ensuring interoperability with other leading vendors is an important feature capability of Lenovo's DC products.

Lenovo's solutions offer the lowest TCO among its leading competitors. However, a lower TCO is not enough; it is imperative for a solution to be superior or at least on par with its competitors' solutions on other important dimensions, for example, *performance* – a major requirement for both public and private datacenters. To determine this, Lenovo commissioned Tolly Group to conduct performance tests on its DC switches for a couple of important routing protocols (BGP and OSPF) convergence timeframes. For tests showed an average of 22% higher performance of Lenovo's DC switches versus the leading competitor's solution. The results also showed that Lenovo is four times better than that of the leading competitor. Other tests revealed that Lenovo's switches did not drop any packets. Packet drops were seen for the leading competitor in the same environment. In most cases, the tests results were twice as favorable relative to the competitor's results.

ACG Research assessed the overall approach and capabilities of Lenovo's DC switches to those of its competitors. The following radar chart depicts our findings:
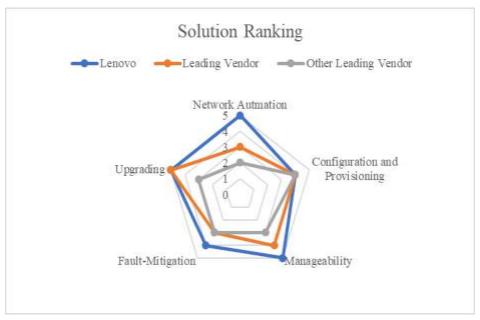
Figure 8. Solution Overall Ranking

Conclusion

Enterprises are evaluating the benefits of their own private cloud and/or those of public clouds. Both approaches have merits. However, the current trend shows the necessity of utilizing a hybrid-mode, but the merits of having a private cloud and operating in a hybrid mode are dependent on choosing the right solution. Selection of the solution for a private (or public) cloud/DC is not solely about capital costs. IT teams must also consider operational costs. The right solution must have high performance, resilient servers and top-of-rack switches, which are integrated and validated with existing DC ecosystems, interoperable with competing vendors' products and solutions, and at competitive price points. It must offer a single point of management that enables agility, visibility, rapid fault-mitigation, and standard interfaces for network analytics, resource provisioning and automation via DevOps.

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