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WHITE PAPER

Managing IT Infrastructure Renewal: A Business Framework to Reduce Server and Storage Costs

Sponsored by: Dell Inc.

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EXECUTIVE SUMMARY

A convergence of factors including macroeconomic stress, increased competition and radically shifting customer interaction models are challenging organizations worldwide to a degree not seen in recent history. Virtually every industry segment is facing major new challenges including financial services, energy, manufacturing, media, automotive, pharmaceuticals and healthcare. For CEOs and their leadership teams, coping with these massive business model challenges has translated into an unprecedented need for innovation at every level of the organization. For IT professionals, this situation has created two difficult opposing forces. On one hand, the need for business innovation directly translates into expanded IT requirements. Be it new software or increased capacity or process improvements to drive productivity, IT is the backbone of most business innovation initiatives. At the same time, while the intense requirement for business innovation has created massive demands for capital from other functions within the organization, IT is being challenged to largely fund these initiatives with internal IT budget savings.

For business and IT leaders confronting the requirement to expand, renovate or renew their datacenter infrastructure, the objective is as crystal clear as it is simple: How can IT capacity be added in the most cost-efficient manner? The tactical question is equally succinct: Is it more cost efficient to buy x86 servers and storage, and run them until failure (i.e., 5 years or more), or is it more cost efficient to systematically replace equipment every three years, taking advantage of next generation silicon technology, embedded systems management and configuration tools; and lower acquisition cost?

IDC research found that systematically replacing x86 servers and related network storage arrays every 3 years, often by leasing and then returning equipment, is at least 25.4% less expensive, compared with equipment (typically owned) that has been installed and operated for 6 years. The principal driver of these cost differences is not the fact that new systems are faster or have more capacity. The principal cost driver is that once year 4 is reached, the support requirements for x86 servers and network storage arrays increase substantially. The (much) higher cost of support radically raises operating expenses – even without applying any value to the increased downtime associated with older systems.

Business leaders have challenged IT to enable new organizational innovation initiatives by reducing IT's internal operating costs. For IT professionals, shifting the acquisition model from "Buy Once/Fix Forever," to "Acquire / Run / Renew " (i.e., only

use the equipment for the most productive and efficient part of its useful life) is consistent and congruent with the changed macroeconomic and operating realities facing business and IT leaders.

IN THIS WHITE PAPER

This IDC White Paper presents key research findings involving the operational costs associated with x86 industry-standard server and network storage array devices, and provides a straightforward economic framework to analyze these findings. IDC has employed this economic framework in direct consulting engagements with IT organizations for many years. In addition, the framework has been presented in many IDC reports, and has been well-received by our clients. Prior to this report, this methodology had not been applied to x86 servers and storage.

The data in this White Paper was derived from two separate research projects on actual support cost experiences of equipment based in the United States, European Union, and select Asia-Pacific countries. Survey findings are based on end-user experiences, with many IT professionals reviewing data on their operating environment as an average across a large portfolio of devices. The responses are not reflective of Dell equipment but include averages for all systems from all vendors. In this report, the data presented is based on the age of the device – an analytic method not typically used and that produces results that can challenge "conventional wisdom" and preconceived notions of IT cost.

IDC chose to specifically exclude any direct economic costs associated with system downtime in this White Paper, principally because the value of downtime is both highly variable and subjective. Moreover, valuing downtime does not change the conclusion – it merely amplifies it. Notwithstanding this point, IDC has chosen to include device failure rates, allowing readers to include downtime factors within their own analysis if they so choose. Also excluded from this analysis is the cost savings associated with upgrading to systems with better power efficiency. IDC acknowledges that the rising costs of power certainly impact the total cost of ownership, but for the purposes of the analysis in this paper, which is to focus on the economic impact of two different acquisition models, some typical "TCO" metrics have been excluded.

SITUATION OVERVIEW – X86 INDUSTRY STANDARD SERVERS

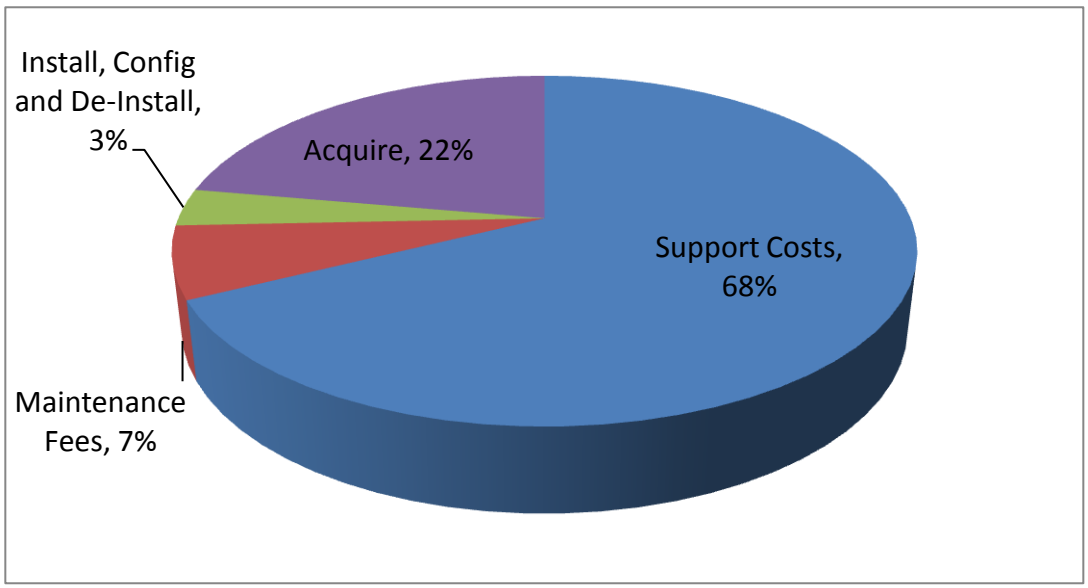
To better understand the operating profile of x86 servers, IDC surveyed the actual operating experiences of 140 organizations. The survey participants were controlled to insure that a representative cross-section of organization sizes, industries, and geographies was included. As two-processor x86 servers represented 70.6% of unit sales during 2009, they were the focus of the analysis. Models that were designed for datacenter use and were well-configured in terms of memory were the focus of the analysis. Based on pricing at the time of this report, these products had a list price of approximately $9,000 each. In the survey, IDC found that these devices averaged approximately 200 users per server. In most organizations, IDC found that these servers had virtualization software installed – significantly raising the install and configuration expense to an average of $1,125 per device.

Server Support Costs

The simple term "support costs" covers a wide range of IT activities. Support typically includes the monitoring and management of IT infrastructure which, when combined with scheduled on-site maintenance, insures optimal infrastructure performance, minimizes unscheduled downtime, and maximizes IT productivity. Typically, this requires extensive real-time monitoring, usually 7x24 on functions that are mission critical to the business. Proactive support and update functions include virus protection updates, server operating system patch management, and numerous infrastructure maintenance tasks. Remedial support functions include problem identification, analysis, and repair or reconfiguration. Aggregating an organization's total cost for these functions (as it applies to its server infrastructure) yields a figure that is often higher than the initial cost of the server and related vendor maintenance. Figure 1 highlights the ratio of acquisition cost, installation/configuration/de-installation cost, and three years of vendor-furnished maintenance expense – as well as three years of support costs.

FIGURE 1

Two-Processor x86 Industry Standard Server; Three Year Total Cost Overview



Source: IDC, 2010

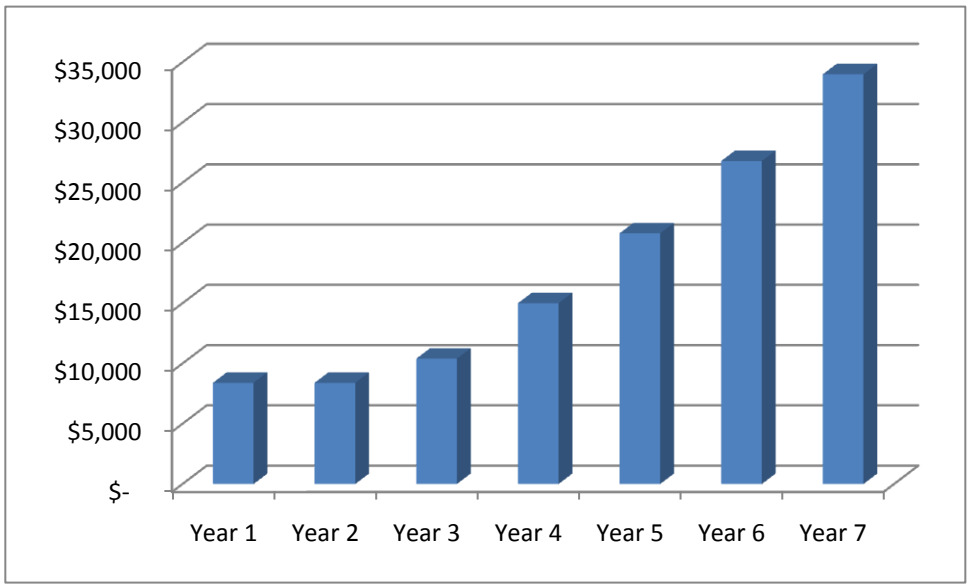
Support costs comprised 68% of the total cost for a 2-processor x86 server deployed for three years. For many business professionals not versed in acquisition / operating expense analysis, this ratio for IT equipment is not dissimilar to what is found with other types of equipment such as aircraft, large transportation vehicles (locomotives or ships) and automobiles. Hence, the cost of operating a device far exceeds its acquisition cost.

Time Changes Everything—Servers

The reality is that support costs increase proportionately with a server's age. Most IT organizations do not regularly correlate service incidents or support costs based on the age of the underlying device. Figure 2 depicts the average support costs per 2-processor x86 server, by year, that IDC identified during this study. Reviewing the graphic shows that support costs in year 7 were more than four times (300%) higher than in years 1 or 2.

FIGURE 2

Annual Support Costs per Two-Processor x86 Industry Standard Server



1 – 200 Users per Server

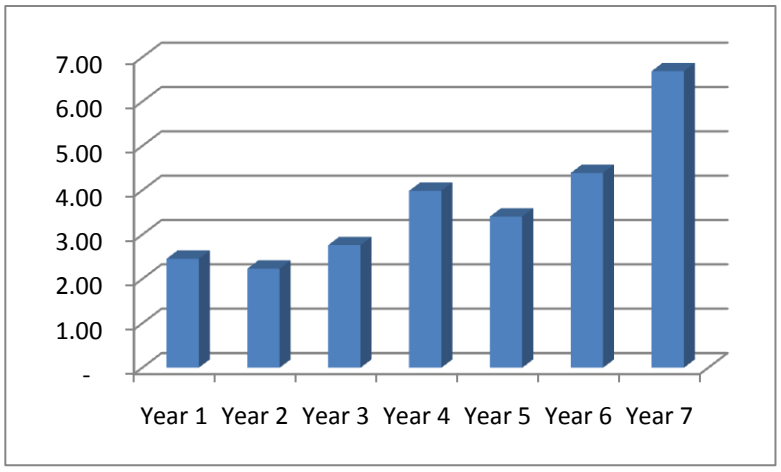
Source: IDC, 2010

The ugly twin of support costs is unplanned downtime. The more often a device requires a proactive reconfiguration or a reactive repair, the more likely that device is to be off-line. Figure 3 shows the average unplanned downtime, by year, for 2-processor x86 servers.

An analysis and comparison of Figures 2 and 3 shows the proportional relationship between support costs and downtime.

FIGURE 3

Annual Downtime Hours, Two-Processor x86 Industry Standard Server



Note: Data is based on average IT organization experiences from a range of vendors and a variety of server types.
Source: IDC, 2010

CONTRASTING SERVER OPERATING MODELS

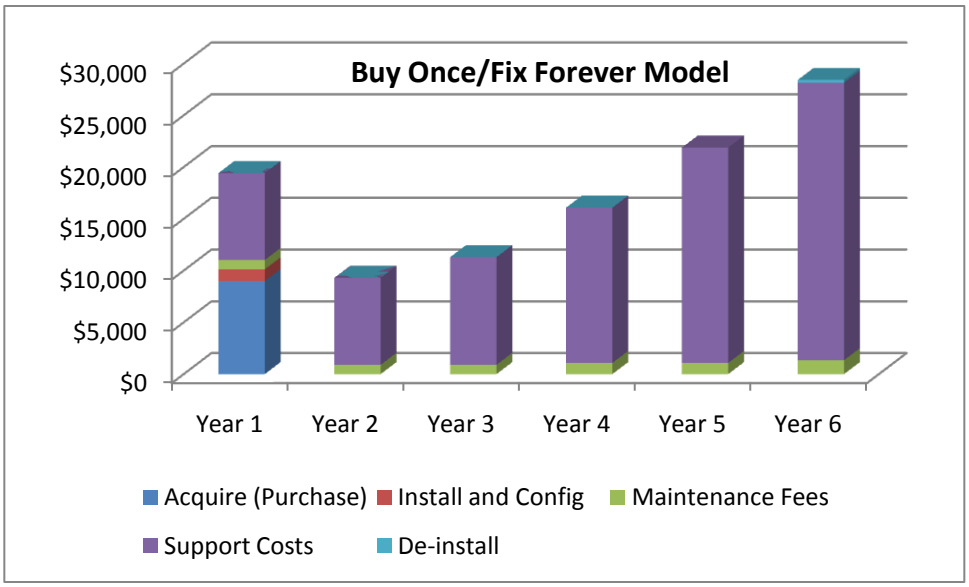
There is a clear choice in server operating models: "Buy Once/Fix Forever" or "Acquire/Run/Renew". The difference between the models is grounded in a critical difference in operating philosophy: *Should the hours spent by "salaried" staff be factored into the more frequently required repairs as devices age, or are they a "fixed cost" that should not be factored into the equation?*

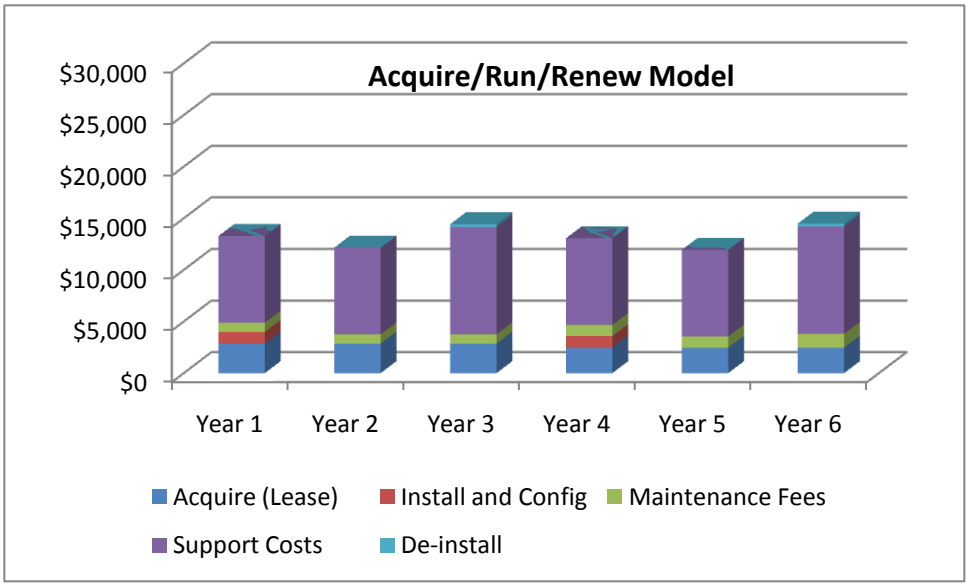
Intuitively, business and IT leaders understand that an older device needs more repairs. However, they can be skeptical that these costs are real. On an emotional level, some managers are suspicious of the Acquire/Run/Replace operating model. They may argue that it is unnecessary or overkill for their organization. Comments such as, "Our organization does need the latest and greatest, just good-enough technology," are often heard in discussions with business and IT managers.

The reality of modern IT organizations is that staff time is tracked, measured, and monitored to a degree that would surprise most other business functions. Sophisticated systems management software tracks and manages tasks, allocates and measures resource loading, and provides detailed reporting about staff utilization, efficiency and effectiveness levels. Having devices that require more support and cause more downtime add to the staff workload. This drives up costs (or holds the operating component of the overall IT budget at unnecessarily high levels) and precludes IT staff from engaging in other, more critical, business initiatives. Figure 4 summarizes and contrasts the two operating models. Based on the real-world experience garnered from extensive IDC survey work, the Acquire/Run/Renew operating model, when examined over a six-year time frame, cost 25.4% less than Buy Once/Fix Forever model.

FIGURE 4

Contrast of x86 Industry Standard Server Operating Models





Message in the data: A two-Processor, x86 server managed on a three-year systematic replacement cycle costs only 74.6% compared with servers managed on a Buy Once/Fix Forever operating model.

Notes: Data is based on a two-processor x86 server, with 200 users per server.

- Buy Once/Fix Forever Model is based on one server, deployed for six years, and owned.
- Acquire/Run/Renew Model is based on two servers, each deployed for three years, and leased.

Source: IDC, 2010

CONTRASTING STORAGE OPERATING MODELS

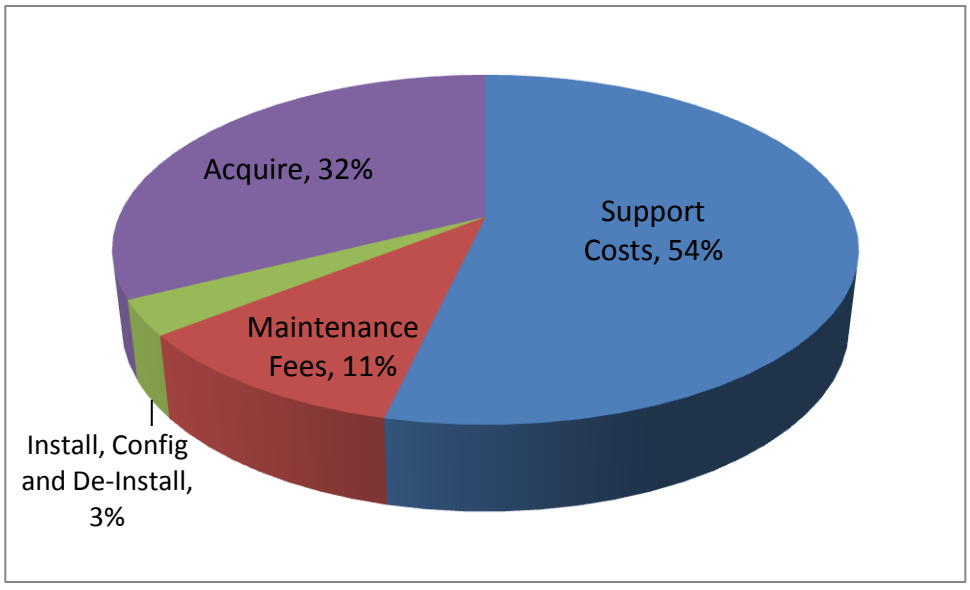
To better understand the operating experience of IT organizations using a network storage arrays solution, IDC conducted a series of executive interviews with 10 organizations in September 2010. With the survey, IDC found that IT organizations' experiences are similar – both to results on x86 servers and to the other IT organizations surveyed. The focus of our analysis was the low-end storage segment. This market segment represented 76.6% of unit sales during 2009 and as the majority, were the focus of the analysis. Based on pricing at the time of writing, representative equipment in this category had a list price of approximately $8,800 and were configured with 6TB of disk.

Storage Support Costs

As with the support costs for x86 servers, the support costs for network storage arrays cover a huge breadth of IT activities. Many functions are similar including monitoring and IT infrastructure management. Proactive support and update functions include operating system patch management and cross-section of infrastructure maintenance tasks. As with servers, remedial support functions include problem identification, analysis, and repair or reconfiguration. Aggregating an organization's total cost for these functions (as it applies to its storage infrastructure) yields a figure that is often higher than the initial cost of the storage and related vendor maintenance. Figure 5 highlights the ratio of acquisition cost, installation/configuration/de-installation cost, and three years of vendor-furnished maintenance expense – as well as three years of support costs:

FIGURE 5

Network Storage Arrays Total Cost of Ownership



Source: IDC, 2010

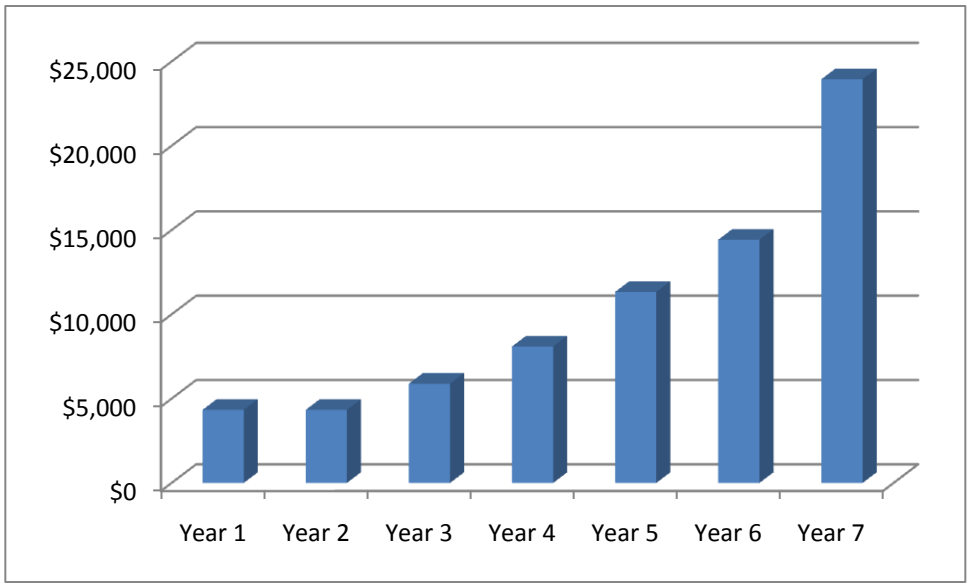
As highlighted in Figure 5 support costs comprised 54% of the total cost for a three-year network storage arrays – coincidentally almost the same with the ratios for two-processor x86 servers. Again, as with servers, this ratio of acquisition to operating cost is not terribly dissimilar to what is found with other types of equipment. That is, for both servers and storage – the cost of operating and supporting a device far exceeds its acquisition cost.

Time Changes Everything—Storage

The reality of storage support costs is that, like servers, their support requirements increase proportionately with age. Figure 6 below depicts the average support costs for network storage arrays by year that IDC identified during this study. Compared with the server support cost analysis shown on Figure 2, network storage arrays also have lower support costs in years 1 and 2. But by year 4, support costs for storage systems exceed those for the servers analyzed. By year 7, support costs were more than five times (400%+) higher than in years 1 or 2.

FIGURE 6

Network Storage Arrays Annual Support Costs

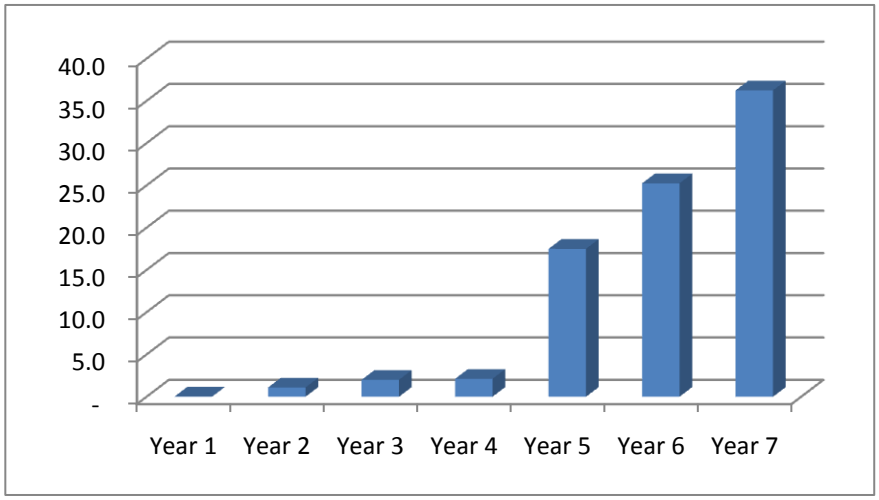


Source: IDC, 2010

The support costs for storage started out lower than the servers in years 1 and 2, then rose to the point that they were higher for the network storage arrays than the 2-processor x86 server. Survey participants reported that the support costs and were driven by the cost, time and complexity of recovering a failed device. Digging into the research findings more deeply, IDC was surprised to see that the downtime data reported by survey participants for network storage arrays. By year 6, average reported downtime exceeded 25 hours per year compared with about 1 hour of downtime in years 1 and 2. The unplanned downtime hours for network storage arrays found in our study are shown below in Figure 7.

FIGURE 7

Annual Unplanned Downtime Hours; Network Attached Storage Arrays



Note: Data is based on average IT organization experiences from a range of vendors and storage equipment types.

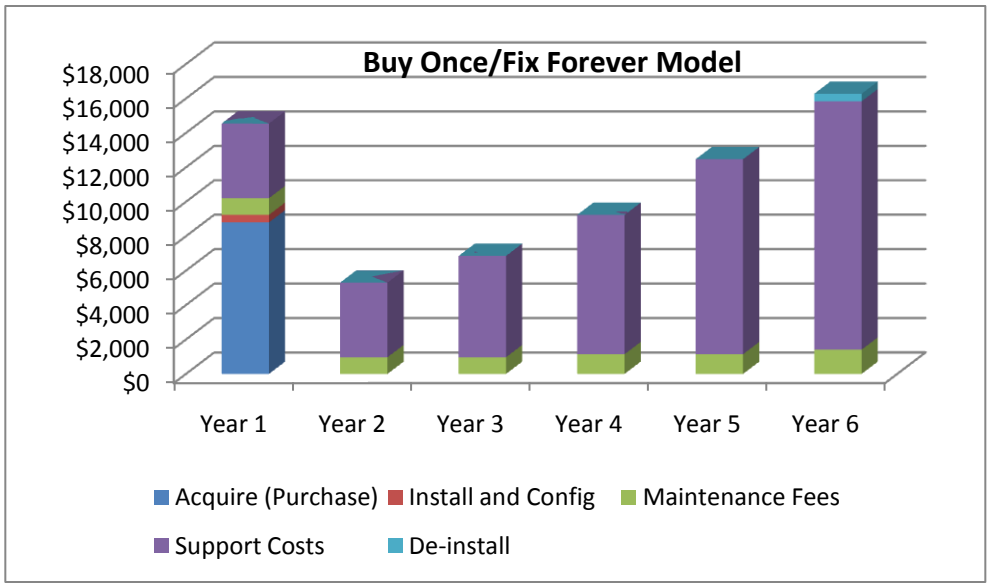
Source: IDC, 2010

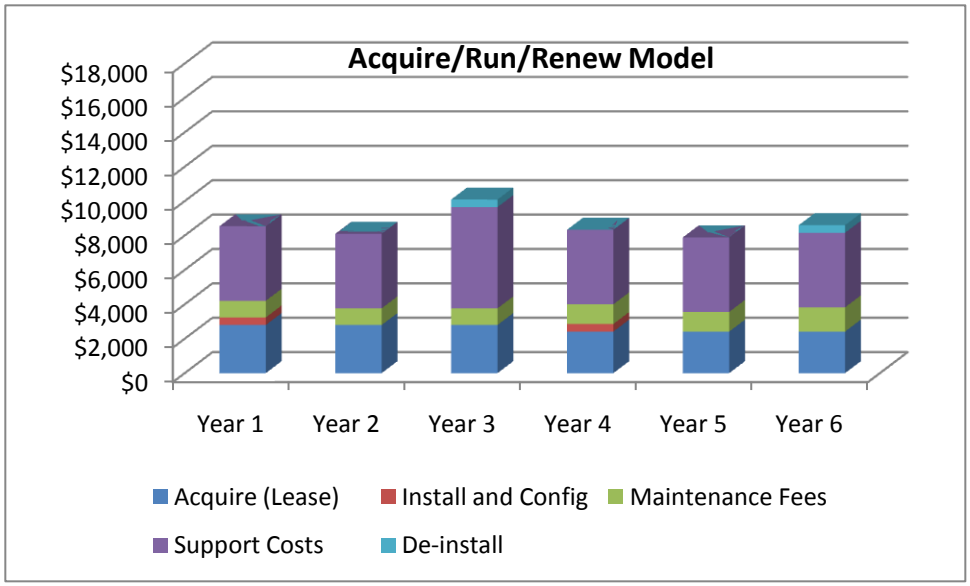
Operating Model Results

As with servers, the results for storage devices were similar but not as pronounced. The "Buy Once/Fix Forever" operating model was higher by 20.3% compared with the "Acquire/Run/Renew" model as shown in Figure 8. Compared with servers, storage devices generally require fewer changes. Because servers have a more complex software stack, including operating system, middleware and systems management software, they require more frequent patching. Storage devices have a difference profile. Generally, storage operates autonomously until a hardware failure disrupts operation. The difference, though, is that when a storage device fails, it can be more complex to recover, and therefore takes more staff resources to recover.

FIGURE 8

Contrast of SAN Operating Models





Message in the data: A SAN managed on a three-year systematic replacement cycle costs only 79.7% compared with a SAN managed on a buy/hold operating model.

Notes:

- Data is based on a SAN with 130 users per device, and usage of 0.046TB per user.
- Buy Once/Fix Forever Model is based on one 6 TB SAN owned for six years.
- Acquire/Run/Renew Model is based on two 6TB SANs leased for three years each.

Source: IDC, 2010

THE COST OF UNPLANNED DOWNTIME

As discussed in the introduction of this report, IDC elected to omit the cost of downtime from the two operating models contrasted. For the server and storage devices discussed in this report, average downtime averages 2.5 hours per year when new and climbs to more than 6.5 hours per year by the seventh year.

Some attempts to quantify the cost of downtime point to the economic consequences of a worst-case scenario such as the closing an online store, a brokerage operation or similarly critical business environment. This line of reasoning often leads to an estimated downtime cost of $40,000 per hour or more. However, in typical deployments, it is highly unlikely that a single two-processor server or network storage array device will cause an outage with this type of financial consequences.

IDC has performed an extensive amount of research into this topic, and our best analysis suggests that devices of this type cost approximately $7,500 per hour of downtime. Further, IDC research shows that devices one to three years old generally incur 2.5 hours of downtime per year. As a result, if the economic consequences of downtime were factored into the report, it is only meaningful to value the excess (the amount above 2.5 hours per year) into a decision processes.

In the analysis presented within this report, IDC choose to exclude the cost of downtime because of its highly variable nature and because it does not change the outcome of the analysis. To the extent downtime values of $7,500 per hour were factored into the operating model comparisons, they would amplify the value of adhering to a model built upon a systematic three-year technology renewal cycle.

LEASING: A LIFE-CYCLE MANAGMENT TOOL

Internal Accounting Practices Can Create Constraints

The financial accounting practices at most large companies are similar and share key limitations. In these organizations, for example, imagine a company whose fiscal year ends at the end of a calendar year. For this company, all equipment acquired during the year is typically accumulated until the beginning of the next year. At that time, the depreciation cycle is started, and for this type of x86 industry standard server hardware and storage, such as Dell's PowerEdge server family and PowerVault storage family of equipment, most companies use a four-year depreciation schedule. Assuming the equipment was bought over the course of the year, it is already, on average, six months old when the depreciation cycle starts. And, because companies do not typically replace equipment right at the beginning of the calendar year, the equipment is usually closer to five years old by the time it is replaced – assuming the IT organization in question has a well-structured renewal strategy. With these practices, and it understandable how equipment often reaches five or six years old before renewal.

For IT organizations that seek to manage their equipment on a life cycle that is shorter than their company's depreciation schedule, another level of complexity is introduced. Because the accounting has already been recorded, many financial managers are reluctant to support IT requests for "non-standard" depreciation

practices except in the most extreme of situations, and certainly not as an operating practice. As a result, the unfortunate situation in many organizations is that accounting practices become the over-riding factor in establishing a technology platform's life cycle management target.

Leasing IT Equipment

Most large IT organizations lease or finance portions of their IT equipment or software portfolio. In a separate research project conducted during April 2010, IDC surveyed 208 companies about their experiences, their degree of satisfaction, and related business outcomes when using leasing programs to acquire and manage their IT resources. The survey included companies ranging from 100 to more than 2,500 employees that are based in North America representing 12 different industries. These organizations provided IDC with a wealth of feedback regarding their life-cycle management practices.

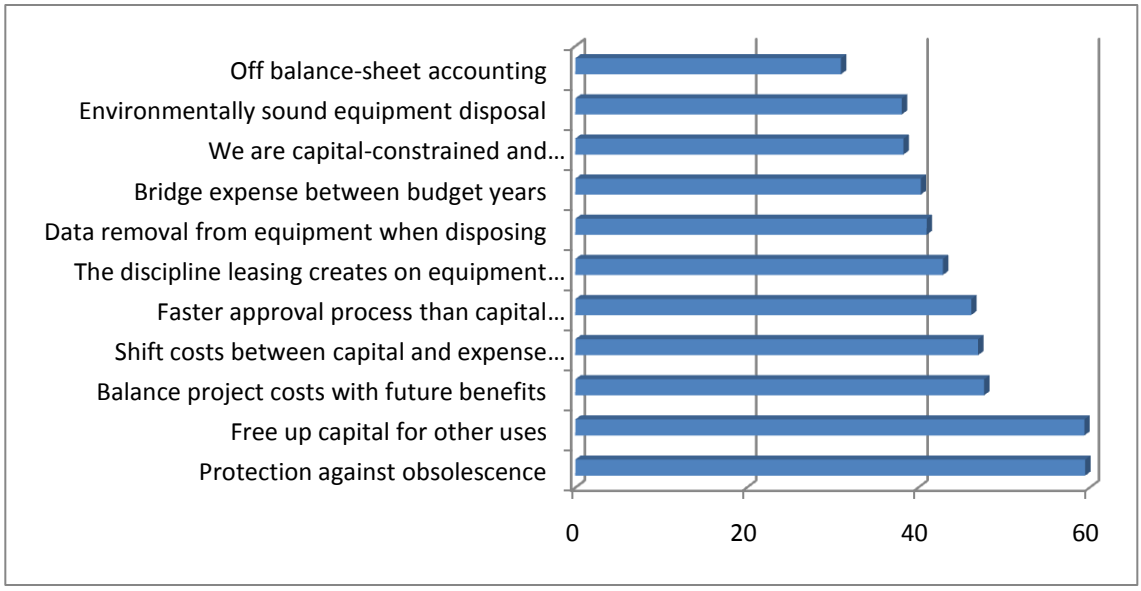
Interestingly, over 70% of the companies surveyed reported eight factors that they said provided "important" or "very important" benefits when leasing or financing their IT equipment as summarized in Figure 9 below:

The survey findings clearly demonstrate that the principal reason IT organizations choose to lease/finance their IT equipment is the flexibility and discipline it affords in managing the renewal cycle. That is, leasing adds a degree of flexibility in managing the duration of equipment deployments that is generally not available when buying equipment.

FIGURE 9

Principal Reasons for Leasing IT Equipment
(% rating "very important")

What are the top reasons you lease your IT equipment?



N = 154 respondents

Source: IDC's 2010 IT Leasing & Financing Survey

CHALLENGES/OPPORTUNITIES

Support Costs

The survey data included within this report presents data in a different manner compared with what most IT organizations typically use to measure their operations. In IDC's experience, few IT organizations analyze platform support costs by year of acquisition. As highlighted earlier in this report (in Figure 2), IDC found in its survey of IT organizations that support costs vary significantly by year. IDC has found this to be true in many other studies and is so common IDC believes it should be built into IT organizational planning models as an assumption. Nevertheless, for many business and IT leaders, to whom this data is being presented for the first time, the initial reaction may be one of denial. Executives accustomed to considering support costs on a "per-device" basis may scoff at the results when reviewing data stratified by year of acquisition; i.e., if the traditional baseline is an average cost across an entire portfolio, managers may struggle to accept results showing a segment of the portfolio has actual costs that are three or four times the average value they are used to reviewing..

For IT leaders facing a skeptical audience, presenting their organization's actual experience will reinforce these findings. IDC recognizes that while the idea of preparing this data for their organization may initially seem daunting, the inputs are often readily at hand. Incident data usually resides within the CMDB systems, and assuming the system has been well-maintained, is usually readily available. Analyzing in-house data and using it to populate the framework shown in Figure 4 can be helpful in winning over skeptics.

The challenge and the opportunity for IT organizations is to focus time and attention on the largest part of a typical IT devices cost – the cost of operating / supporting it over its lifetime.

Leasing Strategy

As noted earlier in this report, many IT organizations rely upon an IT leasing/ financing strategy to provide the option of more closely matching their operating model with actual requirements.

A leasing or financing strategy clearly brings much flexibility, but challenges also exist. One of the major benefits associated with using leasing/financing to acquire IT resources is the flexibility to tailor the financial structure to their organization's business/technology requirements. Nevertheless, at times, some IT organizations may fail to invest enough time and energy into mapping out their requirements two or three years into the future. As a result, as the financial contract matures, it may not map well to the business environment, causing a situation that might have been avoided.

IDC believes that IT leasing and financing options are more than a series of financial offerings: they present a different way of doing business and can challenge IT and business users to carefully consider the business requirements being placed upon

their IT infrastructure and how they will evolve. Having a road map — an understanding of how the financing solution maps to the organization's business, financial, and technical requirements — creates tremendous opportunities to improve the overall IT management planning process – not just for leasing specifically. Finally, as with all major business decisions, a thorough understanding of the opportunities, risks, and their potential costs is most useful when undertaken during the negotiation phase of an acquisition rather than in crisis mode.

CONCLUSION

Based on multiple IDC research projects, including the two conducted for this specific study, the ramped support costs for x86 servers and network storage arrays clearly demonstrate that systematic and timely infrastructure renewal lowers total cost. In the case of the technology platforms presented within this report, the cost difference between "Buy Once / Fix Forever" and "Acquire/Deploy/Renew" averages 25.4% for x86 servers and 20.3% for SAN devices.

Further, based on the accounting and administrative limitations within many organizations, specifically those without the flexibility to synchronize the renewal cycle such that support costs are controlled, an IT leasing and financing strategy is an effective means of shifting the technology renewal cycle.

In IDC's view, business and IT leaders planning an IT infrastructure investment keep two important and overriding concepts top of mind:

1. **The cost of "doing nothing."** There is a real and rising tangible cost of "doing nothing" when comparing the technology acquisition alternative to buy, lease, or "do nothing." When reviewing financial analysis prepared by clients within our consulting practice at IDC, we consistently see the cost of "doing something" contrasted with the cost of "doing nothing." Invariably, the cost of doing nothing is linear out into infinity. In the case of IT equipment and software, this is just not accurate. The incidence of failure directly increases as a function of age — age of technology and age of the equipment. The documentation for this rising instance of failure can typically be found and substantiated from help desk support records. IDC believes that accurately factoring in rising future costs will help business, financial, and IT leaders make better decisions about technology renewal cycles.

2. **Value appropriately internal labor costs.** Some IT organizations and some IT professionals define their value proposition to their own organization as providing IT services and support at the absolutely lowest cost possible. While this is a sound objective, at times it can lead to dysfunctional behaviors that distort business outcomes. Imagine a hypothetical scenario of an IT employee spending three full days rebuilding and reconfiguring a four-year-old Intel-based server that might have a market value of $500. The cost of the employee's labor, fully loaded with benefits, training, etc., can easily run $1,000 per day. The critical questions are: What would be the expected useful life of this device after an additional $3,000 is invested in it? What would be the cost of buying a new server for $1,500 that might have a useful life of three years and new management software that allows configuration in one day? Failure to fully value employee time and effort when making "renovation" decisions can lead to the scenario of "spending one dollar to save ten cents." We emphasize that employees and organizations engaged in this are

absolutely knocking themselves silly trying to do the very best thing for their organization. In IDC's view, a lack of information and business planning in situations can lead well-intentioned, hardworking employees astray.

For business and IT leaders striving to accelerate their business innovation objectives and fund those initiatives via internally generated efficiencies, IDC recommends a reconsideration of their IT equipment operating models. Virtually every IT leader is seeking to shift their IT budget profile such that a larger fraction is devoted to innovation – by wringing efficiencies from improved IT operations. The findings from this research demonstrate that shifting to an operating model structured around 36-month technology renewals, perhaps by using an IT leasing and financing strategy, would directly achieve these strategic objectives for many IT organizations.

APPENDIX: DELL FINANCIAL SERVICES

Beyond financing, leasing companies have developed a suite of services to assist IT organizations in managing the logistics of equipment acquisition, installation, and decommissioning/disposal. These services are in addition to a full suite of lease and financing structures for commercial, education, healthcare, and government organizations.

As a financial organization supporting a top-tier technology vendor with a broad base of customers ranging from large multinational corporations to small local businesses, Dell Financial Services (DFS) has an extended menu of offerings tailored to this diverse installed base. DFS offers a full suite of leasing and financing tools and services to its customers that are acquiring Dell as well as non-Dell IT equipment and software. DFS customers benefit from a simplified solution, bundling services and hardware into a single, fixed, recurring payment.

Technology expertise. Dell and DFS work together to offer and enable the acquisition of the latest technology, helping their customers to take advantage of the most energy-efficient and high-performing solutions available.

Financial strength. With approximately $50 billion in lease/financing transactions since inception and $6 billion of new transactions underwritten annually, DFS ranks as one of the top providers of IT leasing and financial services worldwide.

Lease management services. Dell has a range of business units focused on providing this full range of services, including DFS, Dell Asset Recovery Services, and Dell Managed Services (maintenance). Dell's Asset Recovery Services was recently awarded IDC's G.R.A.D.E. certification, acknowledging its excellence in responsible recycling and disposal of ewaste. Specific to lease and asset management, DFS offers Equipment Return Services and Data Wipe Services to offer peace of mind at lease termination. Additionally, DFS Online Services is a complementary online tool that offers DFS customers a central repository for all contract and asset data where users can manage their leased assets with custom reporting and lease request automation.

International scope. DFS facilitates leasing solutions in over 40 countries throughout the world via in-country leasing partners to deliver an integrated approach on terms and conditions, practices, and order management.

Contract flexibility. DFS provides customers with a range of customizable lease/financing structures including payment deferral options, extended terms, and DFS' 4-Pay program. In addition, the company offers prestated extensions, caps, and other financial structures to help firms manage asset rotation and provide greater transparency into costs.

Remarketing depth. A critical component of providing leasing and financing services is having the in-house capability to resell returned systems to IT buyers able to meet their requirements with equipment one or two generations old. DFS has a broad capability to support IT buyers by readily managing the resale of these older systems.

Administrative capability. All DFS customers have direct access to their dedicated DFS account team. DFS and Dell offer fully integrated order processing and financing via online tools. A key feature of DFS's Online Services is the ability to run reports on all leased, received, and disposed assets, allowing customers greater transparency on their leased infrastructure and the ability to work better with internal accounting and regulatory organizations.