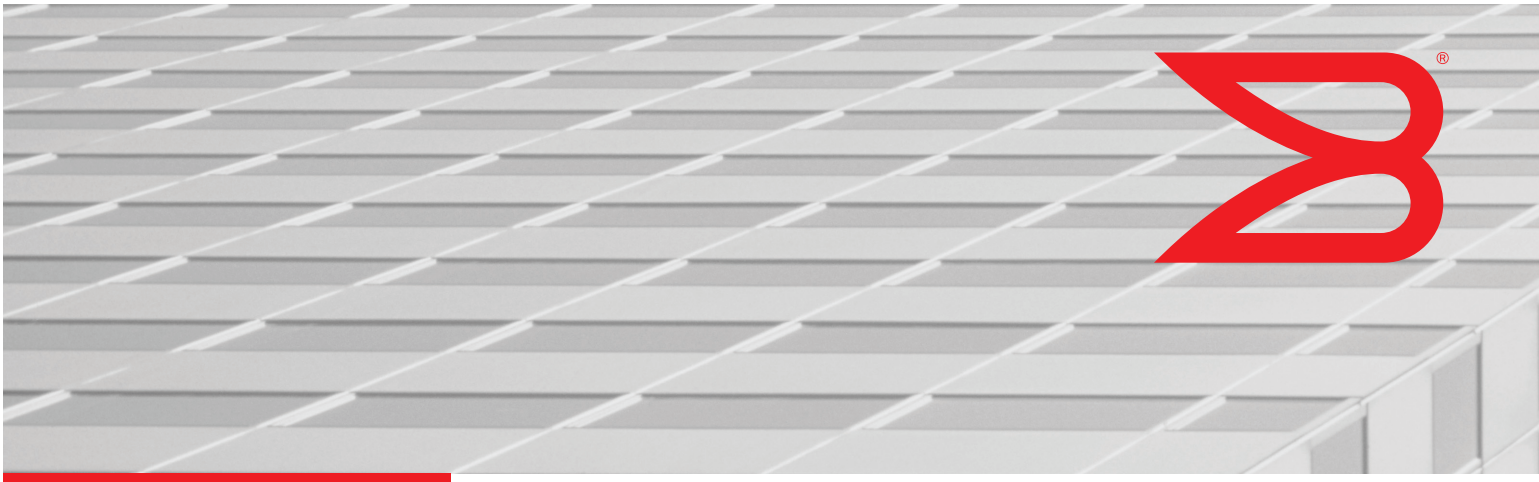

ENTERPRISE CAMPUS NETWORKS

Brocade Campus LAN Switches: Redefining the Economics of Effortless Campus Networks

Efficient switching technology and flexible acquisition models help enterprises reduce the total cost of ownership from network core to edge.

BROCADE

Enterprise IT managers are challenged with building and maintaining increasingly complex networks in the face of continually constrained budgets. Trends in the workplace such as Bring Your Own Device (BYOD), increased mobility, video applications, and greater device sophistication continue to drive network and IT complexity, even though budgets remain flat. Consequently, maximizing Total Cost of Ownership (TCO) is a primary goal for most IT managers as they work to meet the user demands for bandwidth, capacity, flexibility, and scalability.

Brocade offers a broad portfolio of campus LAN products that increase network performance and flexibility, while improving TCO. This paper showcases the newest Brocade campus LAN products and uses three example case studies to demonstrate how the Brocade® ICX™ 6610, ICX 6450, ICX 6430, and Brocade FastIron® SX 1600 Switches enhance customers' TCO from the core to the edge of the network. Finally, it explains the Brocade Network Subscription solution and how it can help companies respond quickly and cost-effectively to business demands.

TRENDS THAT AFFECT TCO FOR ENTERPRISE CAMPUS LAN NETWORKS

TCO is the combination of capital costs (one-time infrastructure expenses) and operating costs (ongoing maintenance and support expenses). Paradoxically, the demands of today's enterprise are driving up both sides of the TCO equation. For example, user mobility is creating a proliferation of device types such as laptops, smartphones, and tablet computers, adding new requirements and security risks to enterprise networks. IT staff are no longer issuing computers to employees. Instead, IT departments must now account for a diversity of devices brought into the organization from outside and must mitigate the networking and security challenges these devices bring.

At the same time, process-intensive applications such as e-learning, multicast video, and voice applications are creating demand for bandwidth from the core to the edge of the network. When you factor in the proliferation of devices throughout a corporate campus, you see why organizations are scrambling to build wiring closets, add bandwidth, and configure edge security solutions to protect the network.

As more companies look to consolidate their data centers and optimize IT investments, cloud computing is gaining traction as a viable alternative to locally hosted applications and infrastructure. This trend creates even more demand for highly available campus LAN networks to enable continuous access to the cloud for business-critical functions. Any downtime in the campus LAN network impacts productivity and, ultimately, revenue.

How does an enterprise IT manager build a reliable network that supports the complexity of user needs while optimizing TCO? There are several things to consider:

- **CapEx (capital expenditure) vs. OpEx (operating expenditure):** Long-term maintenance and support costs may outweigh the initial investment, so choosing the right technology—independent of initial expense—must be considered. For example, the ongoing costs of support, power consumption, real estate, and maintenance may be far greater than the cost of the equipment.
- **Network design:** Designing a network that is easy to install, configure, and maintain saves money over time. For instance, a network with fewer devices is likely to outperform a network with too many devices, because the latter has more points of failure and, therefore, is more likely to experience costly downtime.
- **Method of acquisition:** A vendor that offers flexible alternatives to purchasing equipment—such as leasing or pay-as-you-go subscriptions—helps companies avoid upfront capital expenses, letting them deploy best-in-class solutions without the high overhead.

When looking for a network solution that meets the requirements of dynamic enterprises today, these are all relevant factors. It's important to consider the available solutions in terms of initial capital outlay, as well as long-term costs, to determine which solution provides the best TCO.

THE BROCADE CAMPUS LAN PORTFOLIO

Brocade has consistently demonstrated TCO advantages with its entire campus LAN product portfolio, from the core of the network with Brocade FastIron SX to the edge of the network with the Brocade FCX Series and the recently announced Brocade ICX product family, and with a wireless portfolio of latest-generation 802.11n Brocade access points and controllers. According to a recent article posted on InformationWeek.com, Brocade tops the leading networking vendor on operation and acquisition cost [1].

Now with the new Brocade ICX family of stackable switches, Brocade redefines the economics of enterprise networking by providing unprecedented levels of performance, availability, and flexibility in a stackable form factor. The Brocade ICX 6610 delivers wire-speed, non-blocking

1 Art Wittmann, www.InformationWeek.com, May 13, 2011.

performance across all ports to support latency-sensitive applications like real-time voice and video streaming. Up to eight Brocade ICX 6610 switches can be stacked using four standards-based full-duplex 40 Gbps stacking ports, which provide an unprecedented 320 Gbps of backplane stacking bandwidth with full redundancy, eliminating inter-switch bottlenecks. Additionally, each switch can provide up to eight 10 Gigabit Ethernet (GbE) ports for high-speed connectivity to the aggregation or core layers.

Brocade ICX 6430 and 6450 switches provide enterprise-class stackable LAN switching solutions to meet the growing demands of campus networks. Designed for small to medium-size enterprises, branch offices, and distributed campuses, these intelligent, scalable edge switches deliver enterprise-class functionality at an affordable price—without compromising performance and reliability.

Brocade has also added new enhancements to the Brocade FastIron SX Series of modular switches, increasing 10 GbE port densities to adapt to more network traffic to the core. The Brocade FastIron SX Series switches provide industry leading price performance for campus aggregation and core switching, delivering a scalable, secure, low-latency, and fault-tolerant infrastructure for enterprise deployments. These switches support up to 128 10 GbE ports and 384 1 GbE ports in a single chassis that supports IPv4/IPv6-capable Layer 2 switching and Layer 3 routing. The Brocade FastIron SX Series provides a high-performance, non-blocking architecture and a high-availability design with redundant and hot-pluggable management modules, fans, load-sharing switch fabrics, and power supplies.

The combination of the Brocade ICX 6610, 6450, 6430, and Brocade FastIron SX 1600 switches deliver the industry's leading TCO, from the standpoint of CapEx and OpEx.

TCO COMPARISON AND USE CASES OF THE BROCADE ICX 6610

Here is a look at how the new Brocade ICX product family and the Brocade FastIron SX 1600 compare—in terms of TCO—when measured against competing products.

TCO comparisons require customers to consider the price of the hardware along with the overall network operation—how the network is designed, what the tolerable Service Level Agreement (SLA) is, and what types of applications flow through the network. The Brocade ICX 6610 provides the best combination of low latency, high stacking, and uplink bandwidth, allowing support for bandwidth-intensive applications. The Brocade ICX 6450 and 6430 offer the best combination of cost-effectiveness, stacking, and port density, allowing support for connectivity starved deployments such as K-12 and Higher Education institutions. The following three use cases demonstrate how the Brocade ICX 6610, ICX 6450, ICX 6430, and the Brocade FastIron SX 1600 (with eight 10 GbE ports) perform in such applications.

Use Case 1: Internet-Connected High School

A new-generation, Internet-connected high school in Silicon Valley, California has a newly constructed computer lab; its 200 ports are used to connect students to online coursework other Internet-connected high schools in order to provide a collaborative learning experience. At the same time, the computer lab is equipped with Power over Ethernet (PoE)-powered Access Points and video surveillance cameras.

To improve real-time collaboration, the high school decides to upgrade the bandwidth of their edge network to support multiple 10 GbE uplinks to the aggregation layer, while ensuring Layer 2 segregation of different groups using a Virtual LAN (VLAN) and a Layer 2 protocol to the network edge. The new network uses Spanning Tree Protocol (STP) to enable half of the links to be active and the other half to be inactive, for backup purposes.

In this case, installing the base model Brocade ICX 6450 offers a stacking configuration that allows the high school to provide a resilient, always-connected network for its students. The network comprises a simple stack of five units, each with 48 ports. Each Brocade ICX 6450 is equipped with two 10 GbE ports for stacking and can be optionally upgraded to add additional 10 GbE connectivity to the aggregation layer.

The edge switches are connected to a collapsed core, with Brocade FastIron SX running the latest software release, which supports a resiliency protocol achieved by Multi-Chassis Trunking (MCT).

If the high school chooses a competitor's product, they will be limited to the use of stackable switches that have to be configured with additional stacking ports. Also, the competitor's product includes two 10 GbE ports, regardless of whether these ports are needed, which adds to the cost.

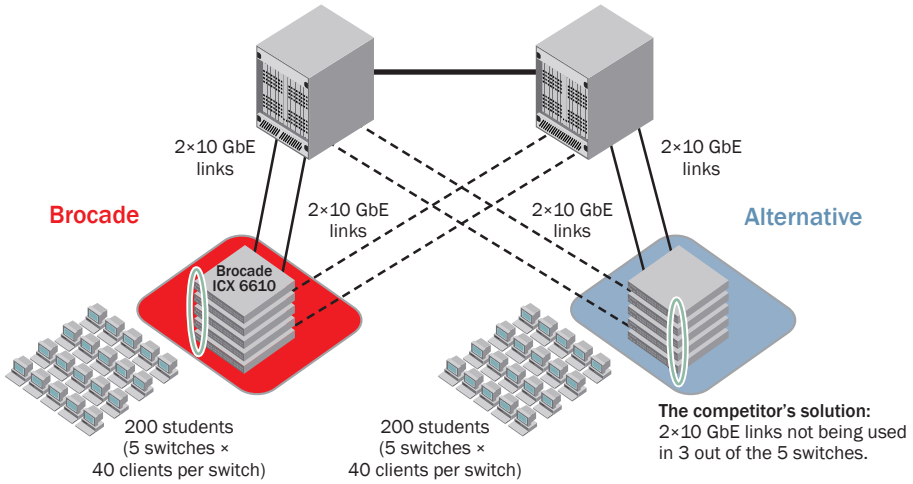

Figure 1.
Comparison of the Brocade solution and a competitor's solution at the edge of the network. It is assumed that the aggregation layer has the same configuration as shown here.

Figure 2 shows a three-year comparison of TCO (expressed in dollars per port, or $/port) between the Brocade solution and a competitor's solution, using the Manufacturer's Suggested Retail Price (MSRP). Whereas the competing solution costs more than $800/port during the first year, the Brocade solution costs less than $400/port. Over Years Two and Three, the cost of support for the Brocade solution provides an additional 48 percent in savings over the support cost for the competing solution.

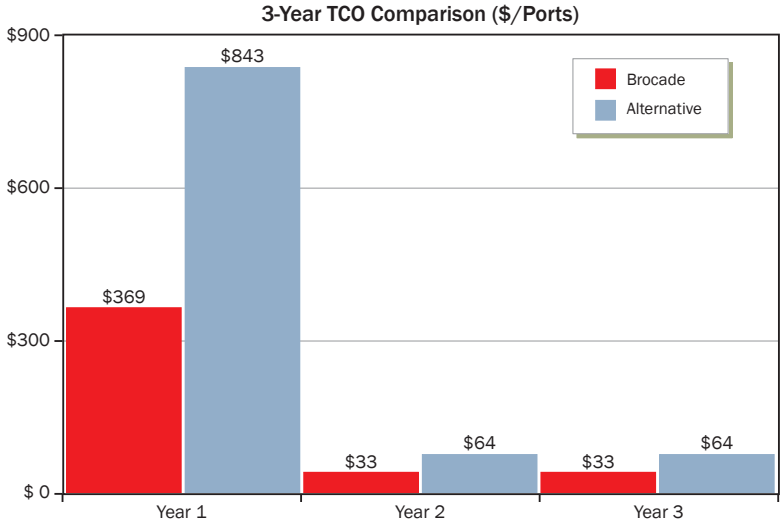

Figure 2.
The Brocade solution reduces CapEx by more than $500 per port and ongoing expenses by more than 80 percent.

Use Case 2: Media Production Enterprise, Take 2

A media production company in Hollywood, California—with 200 developers and several contracts with movie industry companies—produces computer-generated animated characters for movie trailers and video games. The company's developers spend long hours creating detailed animated characters, each of which require up to 50 gigabytes (GB) of data.

Typically, the developers build and render the characters on local high-end computers, then they perform backup operations on each computer to send data to the core network central data server. The current network switching solution requires this high-bandwidth backup activity to be completed after normal work hours to avoid network disruption. As a result, the developers are unable to share their work in real time, which often leads to data duplication—or even data loss, if a local server crashes.

To improve collaboration, the media production company decides to upgrade the bandwidth of their edge network to support multiple 10 GbE uplinks. The network is designed with segregation of edge traffic using a robust Layer 3 protocol, activating all uplinks and eliminating the need for STP.

In this case, the Brocade ICX 6610 offers 320 Gbps in a stacking ring configuration, enabling the company to provide a non-oversubscribed, no-loss, always-connected network for its development team.

With a premium Layer 3 license, the Brocade ICX 6610 enables Routing Information Protocol (RIP) and Open Shortest Path First (OSPF) to the edge of network. The deployment requires a single stack of five units, each with four 10 GbE uplinks, to achieve a non-oversubscribed, no-blocking, no-loss, low-latency network. This network gives the company's developers unlimited ability to create all of the animated characters they wish, while performing backup in real time.

By comparison, the competitor's switch provides just two 10 GbE uplinks per switch, so only 20 clients can be connected to a single switch. To create a non-blocking connection for all 200 developers, 10 switches are necessary. Deploying additional equipment increases not just initial capital outlay (CapEx), but ongoing support, power consumption, and the additional real estate needed for the wiring closet (OpEx) (see Figure 3).

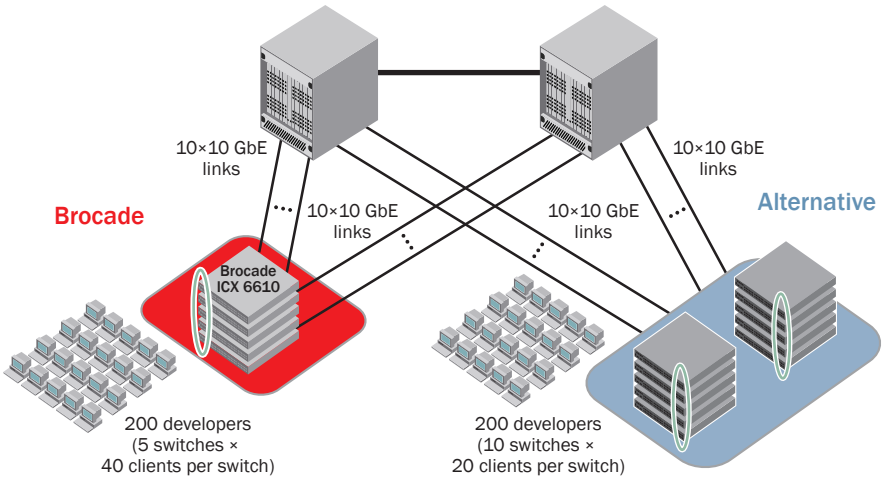

Figure 3.
In a Layer 3 configuration, Brocade outperforms the competing solution, saving customers power consumption and real estate, while providing non-blocking connectivity to the edge.

Figure 4 shows a three-year comparison of TCO (expressed in $/port) between Brocade and the competitor's offering, in MSRP. Whereas a competing solution costs almost $1600/port during the first year, the Brocade solution costs less than $600/port. Over Years Two and Three, the Brocade solution provides about 67 percent savings over the competing solution. Again, the cost of power and real estate further increases the savings with the Brocade solution.

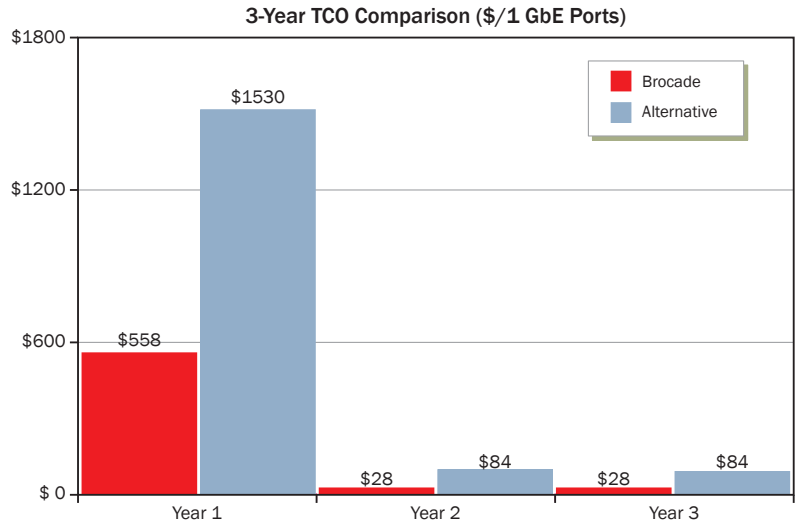

Figure 4.
Brocade outperforms the competing solution, saving customers more than $1000 per port in the first year and about 67 percent in Years 2 and 3.

Use Case 3: Realtor Regional Headquarters

Here is another scenario, in which the Brocade ICX 6430 and ICX 6610 are optimally deployed as an affordable and scalable edge and aggregation solution.

In this example, a real estate company deploys the Brocade ICX 6610-24F platform (with the fiber ports option) in its Boca Raton, Florida regional headquarters as an aggregation switch, along with a low-cost Brocade ICX 6430 at the edge of the network. Here, 3,000 agents and support staff work in three multistory buildings. This regional office is connected via fiber connection to the company's New York headquarters. The network design for the company features a traditional three-tier network, with a wiring closet on each floor of the building (deployed with the Brocade ICX 6430) that is connected to the aggregation closet (deployed with the Brocade ICX 6610-24F), which is located in the basement of each building. Aggregation switches are connected to the core switches, which are located in Boca Raton.

The company differentiates itself by providing live high-definition streaming of open house videos to real estate agents' desktops. Additionally, daily multicast e-learning and news video feeds are streamed to agents to keep them current with any changes in the market or in real estate laws. The agents communicate with Voice over IP (VoIP) phones that require low latency and high Quality of Service (QoS) at all times. These technologies place a tremendous strain on the campus LAN network, requiring multiple GbE uplinks to the aggregation layer and onward to the core switches.

Additionally, the company is expanding its workforce and has purchased another building. Due to lack of space in its basement and the desire to minimize the size of the aggregation wiring closet (to leave more space for employees), a highly scalable multiple 10 Gbps aggregation switch is needed in the new building. In this scenario, a Brocade ICX 6610 virtual chassis with 36 10 GbE ports connects to the edge switches to meet the low oversubscription rate of 3:1 at the edge of the network for 1,000 agents. At the same time, 12 10 GbE ports are connected to the core networks with a 3:1 oversubscription ratio at the aggregation layer. A small, compact Brocade ICX 6610 six-switch stack provides this highly scalable, affordable solution, using only six Rack Units (RU) of space (see Figure 5).

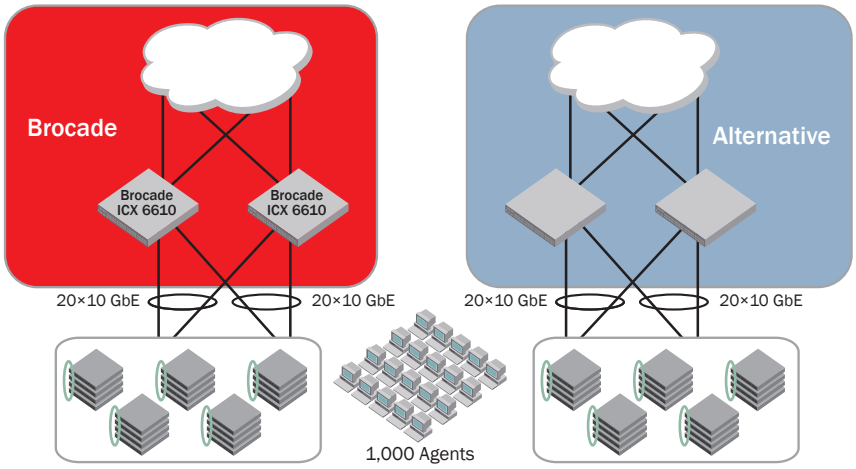

Figure 5.
In a virtual chassis configuration, the Brocade ICX 6610 provides substantial savings in power, real estate, CapEx, and OpEx.

Using the competitor's traditional chassis solution, the company would require two large 14 RU chassis to provide equivalent functionality. Compared to the Brocade ICX 6610 virtual chassis solution, the competitor's solution requires four times the CapEx to deploy and two times the ongoing OpEx to maintain (see Figure 6). Taking into account the additional cost for power consumption and real estate, the Brocade solution provides significant savings.

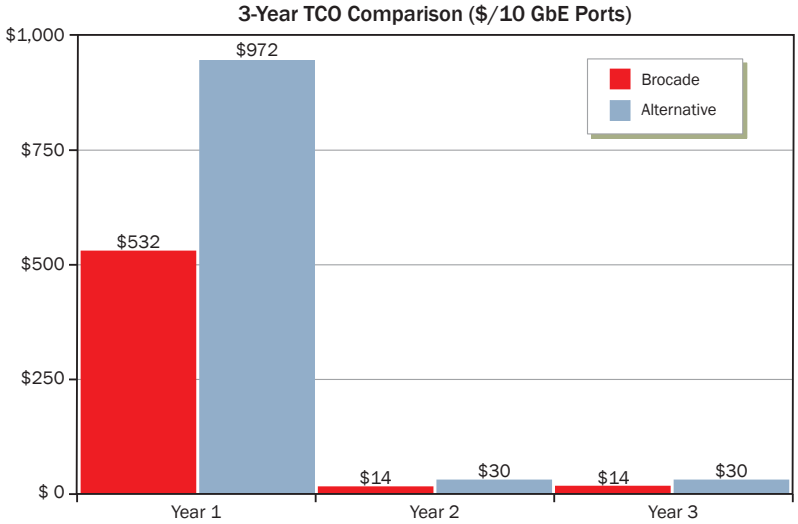

Figure 6.
Customers using the Brocade ICX 6610 virtual chassis solution can reduce the cost of traffic aggregation by nearly $3,500 per port (in this scenario).

FLEXIBLE ACQUISITION USING BROCADE NETWORK SUBSCRIPTIONB

rocade offers three different acquisition models to customers and resellers. In addition to traditional purchase and leasing models, customers can also procure the Brocade ICX product family and the Brocade FastIron SX 1600 using the Brocade Network Subscription model. Brocade Network Subscription is an industry-first subscription-based acquisition option for network infrastructure that allows organizations to align campus LAN network capacity with fluctuating business demands.

Brocade Network Subscription revolutionizes network acquisition by giving customers the flexibility to scale their networks up or down according to actual network utilization, with minimal risk and no capital outlay. Customers pay a predictable monthly fee for their network infrastructure, based on actual usage, thereby reducing costs and mitigating capital risk.

Additionally, the open-ended structure of Brocade Network Subscription affords campus organizations a new level of flexibility in managing their technology assets, such as the ability to refresh network technology outside of traditional purchase cycles. For example, campus customers can initially deploy the Brocade ICX 6450 and 6430 for their closet deployment in Year 1, and then, as new technology becomes available or necessary, they can upgrade to the Brocade ICX 6610 without a large initial capital expenditure.

This unprecedented level of risk mitigation and flexibility makes Brocade Network Subscription an attractive option for any enterprise that is faced with budget constraints or that is looking for more predictable expense management.

SUMMARY

As they face an array of new challenges, enterprise IT managers must find ways to maximize the performance and flexibility of their campus LAN networks while keeping costs down. As the case studies in this paper clearly illustrate, Brocade switches offer the industry's best TCO while enabling IT organizations to scale their networks fast and efficiently as business demands increase. Whether deployed in a Layer 2 or Layer 3 edge configuration or as an affordable aggregation solution, the Brocade campus LAN solutions deliver maximum throughput and efficient savings of space and power, enabling significant reductions in both CapEx and OpEx and helping enterprises gain a competitive edge.

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