

The Business Case for Cisco ACE Application Control Engine Application Switches

Cisco® next-generation application switches deliver measurable improvements in application provisioning times, scalability, performance, and security.

As businesses consolidate their data centers and expand the reach of their core business applications, their data center infrastructures must adapt to support associated changes in availability, security, scalability, and environmental requirements.

Meeting this challenge in the data center substantially helps businesses meet their revenue and profit goals. An annual study of companies with more than 1000 employees conducted by global researcher Infonetics, for example, consistently shows that large organizations each lose millions of dollars every year to application downtime and degradation, despite the existence of mature technologies such as server load balancing. In 2006, a similar Infonetics study of 80 North American midmarket businesses showed that these companies, too, experience application downtime and degradation, at a cost of about US\$867,000 annually in lost revenue and productivity.

Using Cisco ACE Application Control Engine high-performance application switches, however, IT personnel can significantly curb these losses by increasing the manageability, security, and performance of business applications hosted in the data center. Cisco ACE application switches distribute end-user application requests across a server farm. They also offload compute-intensive communications and security processing tasks, such as TCP and Secure Sockets Layer (SSL) encryption processing, from application servers. Application switching and processing offload functions are pivotal to the business continuity of data center applications, and third-party testing has proven Cisco ACE application switches to be the strongest performers in their class.

In addition to these fundamentals, however, Cisco ACE application switches contain enhancements that are unique in the industry to further improve application deployment times and resiliency while delivering significant power and cooling efficiencies and savings. These value-added functions include virtualization and roles-based administration.

Virtualization means that architecturally, a single physical Cisco ACE application switch can function as multiple virtual ACE devices, substantially reducing capital, space, and power requirements in the data center and enhancing an organization's capability to scale its data center resources.

Role-based administration allows different IT personnel and organizations to provision and manage multiple virtual devices in parallel within a single Cisco ACE platform. As a result, IT departments deploy applications much faster than if the different groups had to provision the application switches in a serial fashion.

Using Cisco ACE application switches, with their high performance and unique features, organizations can achieve the following business goals:

- Cost-effectively consolidate data centers while retaining business continuity
- Improve end-user application response times by up to 500 percent
- Optimize server efficiency for fast and consistent user application experiences
- Secure application server farms
- Improve application deployment times by up to 75 percent* while increasing IT productivity
- Cost-effectively scale application deployments

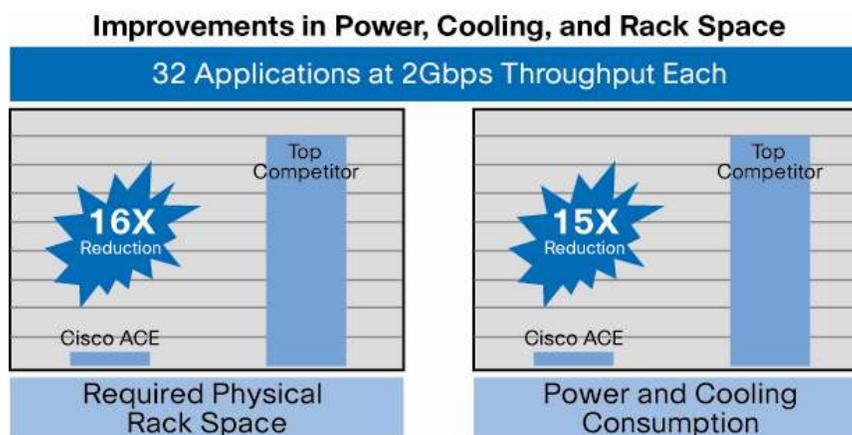
The remainder of this document discusses the ways in which the Cisco ACE application switches empower IT departments to achieve these data center consolidation and application delivery goals.

Cost-Effective Data Center Consolidation

Cisco ACE application switches come in two highly scalable form factors: an integrated Cisco ACE Application Control Engine Module for the Cisco Catalyst® 6500 line of backbone Ethernet switches (and Cisco 7600 Series Routers) and as a standalone appliance. These devices are used on the front end of server farms in the data center to optimally manage application traffic and improve data center operations. As noted, Cisco ACE supports an industry-unique virtualized architecture, which allows IT managers to configure up to 250 separate, or virtual, Cisco ACE instances on a single physical platform, in effect combining 250 devices into one.

Virtualization thus reduces the number of individual application switches needed in consolidated data centers, which often have space limitations. Operating with fewer physical devices reduces capital costs, and having fewer devices in the data center frees up rack space and reduces power and cooling requirements by up to 94 percent according to testing by Miercom, an independent testing facility in Cranbury, New Jersey. The closest application-switching competitor requires 16 times the rack space and 15 times the power and cooling resources in a sample scenario where a customer has 32 applications, each requiring 2 Gbps of throughput (Figure 1).

Figure 1. Cisco ACE Application Switches Deliver Significant Reductions in Space and Energy Consumption Compared to the Nearest Competitor



* Based on Cisco internal IT department usage.

Miercom reports that the conservation that Cisco provides translates into 5-year power and cooling savings of US\$187,000 to US\$261,000 for a midsized enterprise with these requirements. For a sample configuration of 25 virtual devices compared to 25 physical devices, power and cooling savings alone can result in a payback of less than 1 year in a midsized organization.

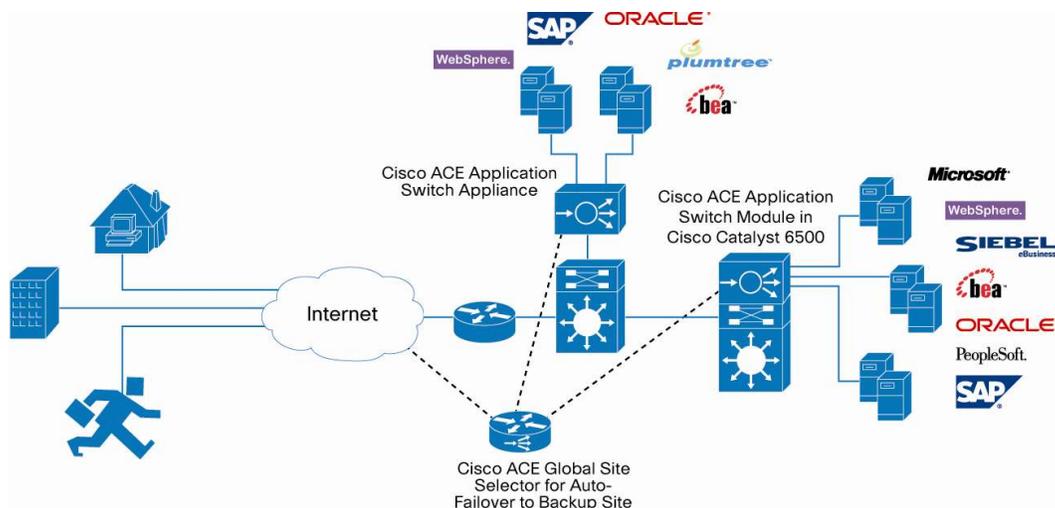
Business Continuity

Cisco ACE application switches enable the high-speed balancing of application requests among any number of servers in the data center. After a user request is associated with a server, Cisco ACE keeps the user connection associated with that server so that individual application sessions do not break. This capability, called persistence, keeps each user session running, increasing user productivity during that session.

Cisco ACE treats the application server farm as a set of redundant resources; if one server goes offline, Cisco ACE automatically balances requests among the remaining servers. This automatic failover system helps ensure that users will always be able to have their application requests served. Another member of the Cisco ACE family, the Cisco Global Site Selector (GSS), automatically sends application requests to a backup disaster recovery site if the primary site experiences an outage.

As Figure 2 shows, typically, customers deploy Cisco ACE application switches in data centers in front of multiple server farms that support many application types. As traffic is sent from clients to the data center servers, it passes through the Cisco ACE application switches for processing.

Figure 2. Basic Data Center Deployment Options



In addition, Cisco ACE application switches provide business continuity to servers further upstream, such as databases and authentication servers. Each application switch contains an extensive set of health probes that automatically determine whether an upstream server is offline. In such cases, Cisco ACE redirects requests to live access-control and database servers so that user application requests can be completed.

The Cisco ACE solution's industry-leading scalability also reinforces business continuity as installations expand. Enterprises can scale the device throughput capacity from 4 to 8 to 16 Gbps with simple software license upgrades. This architecture avoids the need for purchasing new hardware, which can take weeks to purchase, install, and test, as greater performance becomes a requirement. As a result, organizations circumvent any application downtime and degradation associated with hardware-centric capacity upgrades.

The role-based administration function enables multiple logical devices to be provisioned in parallel by separate IT personnel—for example, those in charge of different applications—for tasks such as configuration, monitoring, and routine maintenance. The capability for different IT organizations to manage and maintain application control of disparate IT resources from a single physical box in tandem, rather than linearly, speeds application deployment and problem resolution, making applications available to end users for a larger percentage of the time and further enhancing business continuity.

Application Acceleration: More Speed, Less Traffic

Numerous studies indicate that user patience in waiting for an application after logging in runs out after 10 seconds. A longer delay poses the risk that users will attempt to circumvent the system. Users' rejection of business applications translates into poor returns on application deployment investments as well as degraded user productivity, customer service, and ultimately, sales and revenue.

Because web-based applications are communications intensive, providing LAN-like service over the web can be a challenge. To meet this challenge, Cisco ACE products use a range of acceleration capabilities to boost remote end-user application response times. Among them are compression, flash-forward, and delta encoding features. These functions minimize distance-imposed latency when application requests are served to remote users across a WAN and reduce the number of round-trip data transfers and messages required for any HTTP-based application. Cisco customers using these acceleration technologies have achieved up to 500 percent improvement in response times.

Optimized Server Operations Leads to Lower Capital Expenditures

Cisco ACE application switches offload TCP communications management functions and SSL encryption from application servers so that the servers can devote their computing cycles entirely to their primary mission: quickly fulfilling user requests for application content. Using this offloading capability, Cisco ACE installations have resulted in up to 80 percent additional application-request processing capacity.

The offloading of communications management and SSL encryption optimizes each server's performance, reduces capital investments in server capacity, and minimizes delays in application availability that result from server inefficiencies. Consider, for example, the loss in e-commerce revenue when customers experience response-time lags in shopping cart additions and, in frustration, abandon sales. Increasing server availability is one important way that Cisco ACE keeps applications continuously available and high performing, attributes that contribute greatly to an organization's overall business success.

Built-in Security

Cisco ACE application switches contain integrated firewall capabilities. Cisco ACE performs both Layer 3 access-control filtering and Layer 7 deep-packet inspection (DPI) to identify anomalous signatures that could cause denial of service (DoS). The Cisco ACE Layer 7 DPI feature prevents zero-day attacks by identifying and blocking newly suspicious traffic for which no known malicious signature has yet been identified and stored in a database to match.

This firewall integration alleviates the space, capital expense, management, and possible performance implications associated with having to install a separate security device between data center switches and servers to manage user access and to identify and control malware. Building layers of security protection into all main network junctures is a security best practice that Cisco recommends. One of these areas lies between data center backbone switches and application server farms, because this segment of the network represents the last line of defense between users and the hosted software that is often the target of malicious attacks.

A 2007 Infonetics study shows that large organizations lose an average of 2.2 percent of their annual revenue, or more than US\$30 million, to security attacks, and that a major problem for data centers involves security breaches that corrupt applications. Cisco ACE controls user access and can identify, and then block, anomalous signatures in network traffic targeted at server software that might otherwise cause DoS. In this way, Cisco ACE protects against identity theft, data theft, application disruption, and fraud.

Faster Application Deployment and Improved Scalability

Two compelling challenges faced by today's data centers are how to speed up application deployment cycles and reduce interdependency between IT organizations. Unlike other application-switching solutions, Cisco ACE equipment can reduce the provisioning time required for new applications by up to 70 percent* as well as lower ongoing management time and total cost of ownership (TCO).

Cisco ACE application switches achieve these improvements through device virtualization and role-based administration and a capability called software configuration rollback. Virtualization and role-based administration reduce application deployment times by allowing a single device to support multiple applications and application instances that can be used in parallel by multiple departmental stakeholders. This architecture also reduces TCO by simplifying application provisioning and ongoing management for IT teams, enabling multiple departments or stakeholders to independently manage appropriate, role-assigned tasks.

Using software configuration rollback, the IT administrator can roll back any virtual device to a previous configuration. This capability also allows the IT administrator to easily save an instance of an application in service from one virtual device and gracefully reuse it as new instances of existing applications are deployed in other virtual devices, all without affecting any other applications serviced by the device.

For scalability, IT departments can use the Cisco ACE virtualization capabilities to simply create additional virtual device instances on the existing Cisco ACE platform. IT administrators can do this by simply copying and pasting application module images to a new instance on the device, which can be done in a matter of minutes.

* Based on Cisco internal IT department usage.

Conclusion

Cisco ACE next-generation application switches allow faster, more dynamic application deployment and delivery. They make IT teams more productive and significantly reduce power, cooling, and capital expenses. They also offer a full range of performance and security services.

Using Cisco ACE application switches, IT personnel can significantly curb what industry researchers have deemed substantial productivity and revenue losses due to application unavailability and performance degradation. Cisco ACE has been tested to significantly outperform its competitors in balancing application requests among servers, in offloading CPU-intensive communications and encryption functions from servers, and in applying acceleration functions such as compression. In addition, the Cisco ACE industry-unique virtualized architecture saves on capital expenditures and significantly reduces space, power, and cooling consumption. It eliminates the ongoing expense of managing and maintaining multiple application switches, because up to 250 virtual instances can be supported from a single piece of hardware. Virtualization also improves time to service as deployments grow, because new application instances can be cut and pasted from one partition to a new one in minutes.

Additional business and IT benefits are achieved through the unique role-based administration capability that Cisco ACE offers. This capability allows various IT and departmental stakeholders to work in parallel so that applications can be deployed, managed, and troubleshot quickly and efficiently, yielding greater availability and IT staff productivity. In addition, integrated Layer 3 and 7 firewall capabilities serve as the last line of defense between the user population and the operating system and application software.

For more information about Cisco ACE application switches, visit: <http://www.cisco.com/go/ACE>.



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