Business Case for Data Center Network Consolidation

Executive Summary

Innovations in cloud, big data, and mobility as well as users' expectations for anywhere, anytime, and any device access are defining new data center networking requirements, which include more scalable and high-capacity networks, content and context awareness, comprehensive management of multiple cloud environments, and better network security.

F5 offers a unified data center networking solution that meets these requirements. It uses a common hardware and software framework to deliver multiple services. This simplifies the configuration and management of network resources without any hardware restrictions.

ACG Research analyzed the total cost of ownership (TCO) of a simplified data center use case using the F5 unified solution as compared to a solution using multiple point products. It found that the F5 solution has 83 percent lower TCO, capital expense (CapEx), and operations expense (OpEx) over five years as compared to the point products solution.

CapEx is reduced by unification of all five functions in a single solution, which eliminates replication of i/o ports (back-to-back) and replication of chassis common costs, such as power supplies, backplanes, and software operating systems. OpEx is reduced by the use of a single management interface that eliminates the complexity involved in using five different management interfaces, the consolidation of five vendor service agreements into one, and consolidation of all five functions, each with its own chassis, into a single unified chassis.

KEY FINDINGS

F5 provides a unified data center networking solution that delivers multiple services over a common hardware and software framework. As compared to a solution using multiple point products over five years it has:

- 83% lower TCO, CapEx and OpEx
- Reduced CapEx through elimination of redundant i/o ports and chassis
- Reduced OpEx through use of a single management interface, elimination of multiple vendor service agreements, simplification of operations and maintenance activities
- 92% lower environmental expenses through the elimination of the common costs of multiple chassis

Introduction

Innovations, including cloud, big data, and mobility, are driving data center architects to develop more dynamic and flexible data center networks. Data center users, including employees, customers, vendors, and partners, who expect anywhere, anytime, and on any device access also are defining a new set of data center networking capabilities:

- More scalable and high-capacity network to accommodate traffic growth: Scalability implies that large-capacity increases are delivered at very low incremental cost. This is essential to bring total cost of ownership (TCO) increases in line with the tight budget limits faced by IT managers.

- Content and context awareness: Data center networks must have real-time awareness of subscriber, application and network context to meet users' anytime, anywhere, and any device requirements and to dynamically align cloud and virtualized resources with changing requirements.

- Comprehensive management of hybrid and multiple cloud environments: IT managers face a great deal of complexity as they make the transition from traditional data centers to multiple public and private cloud environments. Approaches that simplify the data center environment and that future proof existing assets are needed to reduce the complexity.

- Better network security: Dynamic users' requirements and elastic data center resources create new types of security threats and attacks. Users' trust in data center services, none the less, depends upon the ability of the network to securely and privately deliver services.

F5's Value Proposition

F5 offers a unified solution for the data center that enables IT managers to optimize, secure and personalize their data center resources. The F5 unified solution also provides greater user and application visibility and control than a solution utilizing multiple point products. It also provides the scalability and capacity to accommodate the expected increases in future traffic.

The F5 unified solution uses a common hardware and software framework to deliver multiple services. The addition and removal of these services within this framework is as simple as adjusting the software licensing schema. The unified framework means that there is a common technology to understand and manage.

The F5 unified solution provides the performance and scale necessary to unify data center networking functions within a single architectural solution. It features high system availability and includes sophisticated health monitoring, fast system failovers, and comprehensive connection mirroring to ensure service uptime and at-peak performance. This enables simpler configuration and management of network resources without any hardware restrictions.

This solution gives data center operators the ability to scale performance on demand, virtualize or horizontally cluster multiple systems, creating an elastic infrastructure that can efficiently adapt as business needs change.

Data Center Network Consolidation Use Case

The total cost of ownership of a data center network consolidation use case is presented to illustrate the advantages of the F5 unified solution versus an alternative consisting of multiple point products. The functions analyzed are:

- Load balancer: Employs intelligent traffic steering to deliver applications to users in a reliable, secure, and optimized way
- Firewall: Guards data centers against incoming network threats
- Application acceleration: Overcomes network, protocol, and application issues to meet application performance requirements
- Access policy: Provides secure and high-performance unified global access to applications
- Web application firewall: Secures web applications in the data center against application attacks such as HTTP flood and low-bandwidth (slow and low) attacks

Traffic Model

TCO is estimated by configuring the F5 unified solution and the alternative point products solution to meet traffic requirements defined as throughput (Gbps) and TCP connections per second (CPS). Table 1 shows how values representative of a typical data center are inter-related and calculated.

Metric	Value	Role in Model
Concurrent Connections (CC) (million)	2.0	Starting point for traffic estimation
Ratio of CC to Throughput (million/Gbps)	0.5	Used to estimate throughput
Throughput (Gbps)	4.0	Output for configuring network elements
Ratio of CC to CPS	200	Used to estimate CPS
Connections per Second (CPS) (million)	0.01	Output for configuring network elements

Table 1 – Traffic Model

Concurrent connections are the starting point for the traffic estimation. The data center handles two million simultaneous (concurrent) TCP connections. The ratio of concurrent connections to throughput is used to calculate throughput, and similarly the ratio of concurrent connections to connections per second is used to calculate connections per second.

F5 Unified Solution

Figure 1 shows the F5 unified solution, which is hosted by the BIG-IP application delivery controller.

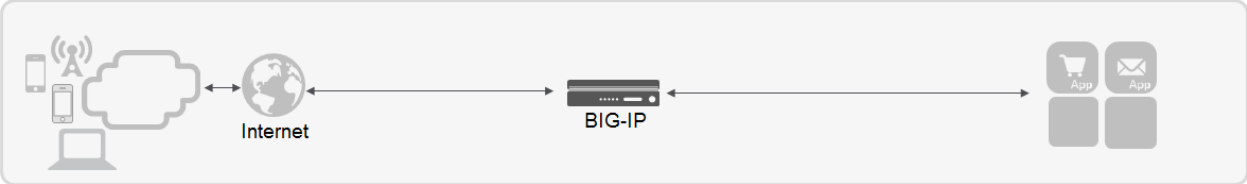

Figure 1 – F5 Unified Solution

The BIG-IP platform provides a unified solution that simplifies the network by hosting all software applications on a single platform and providing a single unified management interface. It features a scalable architecture that includes:

- On-demand scaling: Software license upgraded on demand
- Operational scaling: Multitenant device virtualization, role-based access
- Application scaling: Scale across device and service clusters

The F5 software applications are:

- BIG-IP Local Traffic Manager (LTM): Provides traffic management, load balancing, and application delivery
- BIG-IP Advanced Firewall Manager (AFM): Provides a network firewall, SSL visibility at scale, and network-layer and session-layer distributed denial-of-service (DDoS) mitigation
- BIG-IP Application Acceleration Manager (AAM): Offloads the network and servers to decrease the need for additional bandwidth and hardware and provides integrated application delivery optimization
- BIG-IP Access Policy Manager (APM): Provides access management, secure remote access, and user context
- BIG-IP Application Security Manager (ASM): Delivers application security, web scraping and bot prevention, and HTTP DDoS mitigation

The routers and other network elements shown in the diagram are common to both solutions and, therefore, are excluded from the analysis.

Alternative Point Products Solution

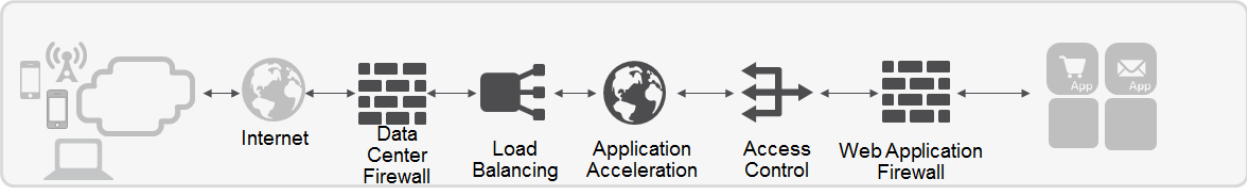

Figure 2 shows the alternative point products solution where each function is hosted by a separate network element.

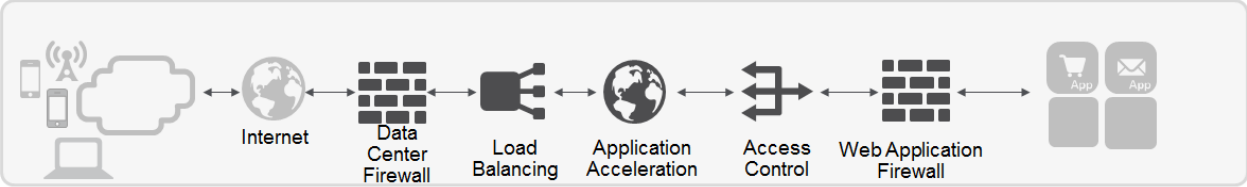

Figure 2 – Alternative Point Products Solution

In this solution each function is hosted on a separate appliance. The study incorporates the configuration, performance characteristics and market pricing of each appliance type of a leading vendor.

TCO Results for Network Consolidation Use Case

Figure 3 shows the TCO comparison for the network consolidation use case.

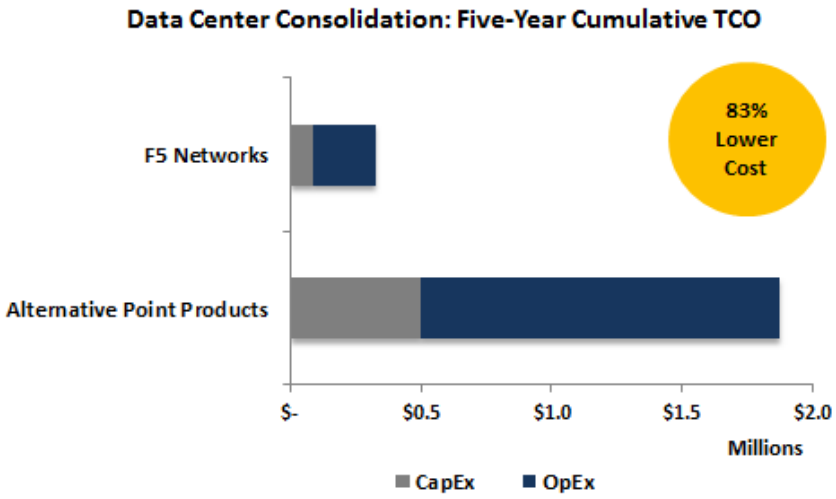

Figure 3 – Five-Year TCO Comparison

The F5 unified solution has 83 percent lower TCO over five years as compared to the alternative point products solution. Capital expense (CapEx) and operations expense (OpEx) also are 83 percent lower. Unification of all five functions in a single solution eliminates replication of i/o ports (back-to-back) and replication of chassis common costs, such as power supplies, backplanes, and software operating systems. This is the primary source of the CapEx savings produced by the F5 unified solution.

Vendors' service contract expense is a very large portion of total OpEx for this use case. The F5 unified solution has 85 percent lower service contract expense than the alternative point products solution. The use of a single management interface by the F5 unified solution eliminates a great deal of the complexity involved in using five different management interfaces for the alternative point products solution. Also, one service contract consolidates much of the administrative and staffing overhead incurred when five separate contracts are required.

Figure 4 provides a comparison of all other OpEx items (service contracts excluded) for the F5 unified solution and alternative point products solution.

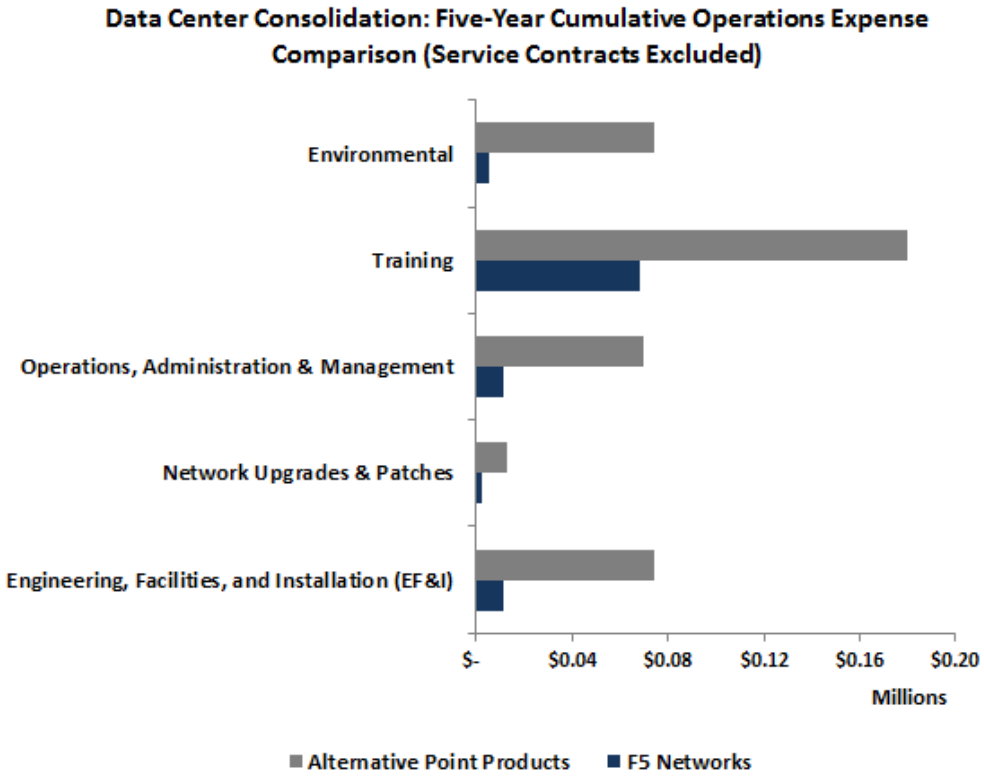

Figure 4 – Five-Year Cumulative OpEx Comparison (Service Contracts Excluded)

Training cost is the second largest OpEx category. It is 62 percent lower than the training cost of the alternative point products solution. The cost is lower because 1) it is only necessary to learn a single management interface for the unified solution and 2) it consolidates five separate training curriculums into one. The F5 unified solution has cost savings for each of the other OpEx elements because less work is required to operate and maintain one chassis rather than five chassis. Also, environmental expenses are lower because one chassis requires less power, cooling and floor space than five chassis.

Conclusion

Innovations in cloud, big data, and mobility as well as users' expectations for anywhere, anytime, and any device access are defining new data center networking requirements that include more scalable and high-capacity networks, content and context awareness, comprehensive management of multiple cloud environments, and better network security.

F5 offers a unified data center networking solution that meets these requirements. It uses a common hardware and software framework to deliver multiple services. This simplifies the configuration and management of network resources without any hardware restrictions.

ACG Research analyzed the TCO of a simplified data center use case using the F5 unified solution as compared to a solution using multiple point products. It found that the F5 solution has 83 percent lower TCO, CapEx, and OpEx over five years as compared to the point products solution.

CapEx is reduced by unification of all five functions in a single solution that eliminates replication of i/o ports (back-to-back) and replication of chassis common costs, such as power supplies, backplanes, and software operating systems. OpEx is reduced by use of a single management interface that eliminates the complexity involved in using five different management interfaces, the consolidation of five vendor service agreements into one, and consolidation of all five functions, each with its own chassis, into a single unified chassis.

ACG Research is an analyst and consulting company that focuses in the networking and telecom space. Our best-in-class subject matter analysts have a combined 120+ years of experience and expertise in telecom segments that address both technology and business issues. We offer comprehensive, high-quality, end-to-end business consulting and syndicated research services. www.acgresearch.net.