



Accelerating application delivery with nimble networking platforms

By Melanie Christiansen and Fred Johnson

Integrating F5 Networks® application delivery and file virtualization systems with Dell™ networking platforms helps create secure, scalable, and highly available IT infrastructures that dynamically adjust to business demands.



Seamless long-distance workload migration

Imagine automating and orchestrating workloads between geographically dispersed data centers, while seamlessly preserving user sessions and active client connections. Watch this video to discover how the F5 BIG-IP WAN Optimization Module utilizes VMware vMotion™ technology to enable long-distance virtual machine migration over a WAN.

bit.ly/pu4kPF

As enterprises continue to converge and scale data centers for heightened IT efficiency and business agility, the need for open, flexible, and efficient connectivity intensifies. Agile networking platforms that enable organizations to expand or distribute computing capacity dynamically in response to business demand are particularly important in virtualized environments and cloud-based operational models.

Enhanced application delivery and file virtualization allow organizations to increase business efficiency while lowering total cost of ownership (TCO). Dell and F5 Networks help advance strategic goals and accelerate return on investment (ROI) through a comprehensive range of technologies, services, and resources. F5 components integrated with Dell enterprise platforms are designed to boost performance, security, and availability by optimizing network, application, server, and file storage environments.

F5 application delivery controller (ADC) systems interconnect with Dell network infrastructures—comprising switches, routers, and transport and access systems—to enhance access to servers and storage in data centers. F5 ADCs provide advanced services for upper-layer application protocols such as HTTP and HTTP over Secure Sockets Layer (HTTPS), Session Initiation Protocol (SIP), Messaging Application Programming Interface (MAPI), Remote Procedure Call (RPC), Diameter, Asynchronous

JavaScript and XML (AJAX), JavaScript Object Notation (JSON), Common Internet File System (CIFS), Network File System (NFS), and others. The word *layer* in this case loosely refers to the Open System Interconnection (OSI) model, a method of standardizing the functions of a communications system into logical parts, or layers. With few exceptions, Dell switches and routers focus on delivering services at Layers 1, 2, and 3—physical connectivity, routing protocols, IP packets, virtual LANs (VLANs), Spanning Tree Protocol (STP), and Ethernet frames—while the F5 BIG-IP® ADC and the F5 ARX® file virtualization device primarily handle Layers 4 through 7. All seven layers are important for the delivery of data center services.

F5 ADCs also provide advanced features including the F5 Traffic Management OS (TMOS®), a custom, high-performance platform for BIG-IP systems that runs on purpose-built hardware; alternatively, it may run as a virtual appliance. TMOS offers a foundation for the full proxy architecture and the low-latency, high-throughput performance required for application traffic processing, deep packet inspection, and add-on software modules. BIG-IP systems provide Secure Sockets Layer (SSL) acceleration, distributed denial-of-service (DDoS) protection, the F5 iRules® scripting language, protocol optimization, high availability, a seven-year life cycle, and integrated automation features.

Additional BIG-IP feature sets can be enabled through license key add-on software modules that



combine different capabilities on the same unit. For example, the F5 IPv6 Gateway™ feature is designed to create a simplified migration path from IP version 4 (IPv4) to IPv6. The F5 Application Security Manager™ (ASM™) product module provides a Web application firewall (WAF) and helps protect Layers 2 through 7 against malicious attacks. The F5 Access Policy Manager® (APM™) solution performs advanced remote access and authentication functions designed to create a security perimeter around the applications. F5 WebAccelerator™ (WA™) and F5 WAN Optimization Module™ (WOM™) products speed services to enhance the end-user experience and help reduce data transfer times between data centers.

Streamlining application delivery

Working together, Dell and F5 technologies help improve network agility and streamline application delivery. Administrators can leverage management tools available on Dell and F5 platforms to treat application delivery networks as a single entity, enabling comprehensive visibility and control of the networking environment. (For more information, see the sidebar, “Unified management of networking environments.”)

Open management architectures common to these systems allow customization through scripting with the Perl or Python programming

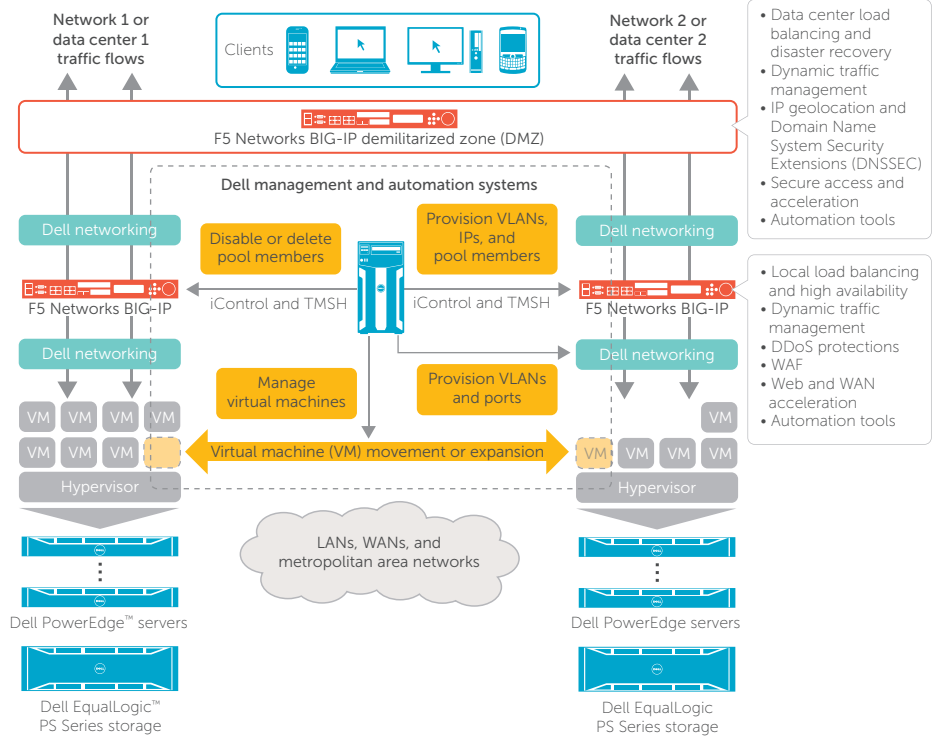


Figure 1. Workflow automation: Virtual machine movement in a multiple network configuration

languages and integration with a range of management platforms such as Dell Advanced Infrastructure Manager (AIM)—a component of the Dell Virtual Integrated System (VIS) portfolio—and VMware® vCenter™ virtualization. Networked application systems can be built programmatically from bare-metal switch provisioning and VLAN provisioning to

virtual machine management across networks or multiple sites and advanced ADC services (see Figure 1).

To help individual organizations smooth the transition to highly automated, increasingly agile data center networks, Dell Services offers varied approaches based on the complexity and corresponding level of management support appropriate

Unified management of networking environments

The Dell OpenManage™ Network Manager (OMNM) suite of management tools enables IT organizations to easily maintain centralized management of their Dell PowerConnect™ networking infrastructures. Organizations deploying networking infrastructures that utilize Dell and F5 resources can upgrade their OMNM suite for additional F5 BIG-IP support with Redcell OpsCenter from Dorado Software. Redcell offers the following device driver features for F5 BIG-IP systems:

- Simple Network Management Protocol (SNMP)–based device and port discovery and resynchronization
- Enterprise management information base (MIB) data and specific SNMP trap support
- SNMP direct access and key performance indicators
- Internet Control Message Protocol (ICMP) monitor
- Network view and reports

for each engagement. In addition, F5 BIG-IP version 11 can extend flexibility, visibility, and ease of administration to help organizations heighten control within their data centers. (For more information on F5 BIG-IP agility features, see the sidebar, "Robust tools and protocol support.") F5 ScaleN™ pay-as-you-grow architecture provides the following features:

- Flexible deployment of physical and virtual F5 BIG-IP system combinations
- Virtual cluster multiprocessing (vCMP) for running multiple virtual instances on F5 BIG-IP VIPRION® blade chassis to support multitenant environments and enhance utilization of the hardware
- *n*+1 clustering of appliances to enable organizations to procure the appropriate amount of hardware as their infrastructures grow
- Virtual appliances for add-on software modules

BIG-IP version 11 allows administrators to provision the Application Visibility and Reporting (AVR) Analytics module, which enables the following capabilities:

- Obtaining real-time visibility into Web application and user performance
- Analyzing performance of Web applications with detailed metrics such as transactions per second, server latency, page load time, request and response throughput, and sessions

Managing data dynamically with file virtualization

Intelligently managing file share data across heterogeneous storage platforms without impacting end users might be considered the ultimate goal for storage administrators. The F5 ARX file virtualization platform enables IT organizations to cost-effectively address the challenges of file storage in virtualized environments. The ARX platform virtualizes standard CIFS and NFS share access to create a global name space and a proxy layer of abstraction between clients and the file-sharing infrastructure.

A federated view of the file storage infrastructure can include network attached

Robust tools and protocol support

Enhanced functionality in F5 BIG-IP version 11 includes a rich set of tools and support for platform management. These enhancements help simplify network administration and enable enhanced automation in the data center to complement Dell networking infrastructures.

- **F5 iApps™ templates:** Easy-to-use configuration templates can be used to create and manage BIG-IP configurations. F5 iApps templates are customizable and portable, and they can be exported to and imported from other BIG-IP systems to help organizations as their applications move beyond the walls of the physical data center.
- **F5 iControl® application programming interface (API):** This F5 open API based on Simple Object Access Protocol (SOAP) and XML enables applications to work in concert with the underlying network based on software integration.
- **Traffic Management Shell (TMSH):** The F5 on-device shell for managing all aspects of the BIG-IP system offers scripting capability and script-level variables to give administrators a powerful tool for automating and standardizing frequently performed operations.
- **iRules:** This Tool Common Language (Tcl)-based scripting feature provides advanced control for directly manipulating and managing IP application traffic as it passes through the BIG-IP system. The tool uses an easy-to-learn syntax and enables administrators to customize the way inbound or outbound application traffic is intercepted, inspected, transformed, and directed.
- **Simple Network Management Protocol (SNMP):** F5 devices support monitoring and alerting capabilities using the Internet-standard SNMP.

storage (NAS) devices, cloud-based storage devices such as the Dell DX Object Storage Platform, and services such as Amazon Simple Storage Service (Amazon S3). ARX can untangle the complex web of mount points and embedded links within applications. With ARX inline, clients simply mount the shares or exports on the ARX system and the ARX makes the connections to the back-end file storage devices.

There are various ways to dynamically manage file data as it passes through the ARX systems. The F5 iControl API facilitates programmatic queries to ARX for data indexing, search, and monitoring, or for taking action on a condition. Policy-based

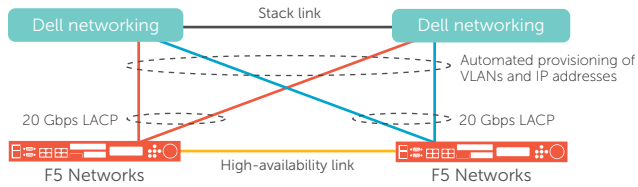


Figure 2. F5 high-availability 10GbE network configuration: Dell stacking switches, LACP, and VLAN tagging

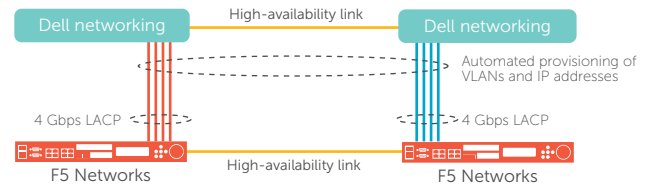


Figure 3. F5 high-availability GbE network configuration: Dell non-stacking switches, LACP, and VLAN tagging

management allows administrators to create ARX configurations for placement, tiering, load balancing, backup optimization, and migration of file data. ARX relies on standards-based network technologies and, like BIG-IP systems, can be interconnected to Dell switching infrastructures to help further reduce operating costs.¹

Deploying high-availability configurations for application delivery networks

Interconnecting F5 devices to Dell networking infrastructures can be accomplished using standard technologies and protocols. Figures 2 and 3 show best-practice examples of high-availability switching scenarios for F5 BIG-IP and ARX platforms, in 10 Gigabit Ethernet (10GbE) and Gigabit Ethernet (GbE) configurations, respectively.

The Link Aggregation Control Protocol (LACP)—IEEE 802.3ad and 802.1AX-2008—is designed to provide maximum available bandwidth and resiliency while minimizing STP complexity. The IEEE 802.1Q networking standard for VLAN tagging allows traffic for one or more networks to transit the aggregated links while helping simplify administration. Changes, such as VLAN and IP address provisioning, can be automated through the F5 BIG-IP iControl API or Traffic Management Shell (TMSH) scripting without requiring any physical port or cabling changes.

Meshed interconnects (see Figure 2) avoid failover on BIG-IP systems in the event of an upstream switch or cabling failure. During this type of outage, the LACP channel stays connected to

the available upstream switch, and the total available bandwidth is reduced by half until repairs are completed. Avoiding a BIG-IP system failover helps maximize application availability during the infrastructure outage. This model can also be applied to blade chassis switches (with a backplane) in which the LACP channels are split across blades to enable similar high-availability results.

Each BIG-IP LACP channel can be connected to a separate upstream switch (see Figure 3). This configuration provides port-level fault tolerance in the event of a port or cabling failure. The loss of the upstream switch servicing the active BIG-IP system can cause a failover to the standby unit. Additionally, BIG-IP systems provide a variety of monitoring and persistence capabilities to help ensure accurate responses to changes in the infrastructure and maintain existing traffic flows with the least possible interruption.

Driving agility in the data center

Dell and F5 Networks together offer best-practice configurations, management tools, and services for connectivity solutions that are designed to meet dynamic business demands while helping to achieve TCO and ROI goals. Through F5 ADC systems that integrate with Dell networking infrastructures, organizations can enhance server and storage access and utilize advanced services for a range of upper-layer protocols. Adopting this highly scalable, programmatically accessible approach to application delivery and file virtualization systems enables organizations to accelerate strategic initiatives—capitalizing

on open, innovative technologies to optimize workflows and boost efficiency in elastic, on-demand data centers.

While new data center technologies and architectures promise unprecedented opportunities, it can be challenging to support business demands during the transition. Dell Services offers deep networking expertise to help organizations cost-effectively simplify, automate, and standardize infrastructure to help improve efficiency and increase application availability. From initial assessment through implementation and managed services, Dell delivers comprehensive networking and application services with highly capable Dell and F5 networking devices and platforms. **PS**

Authors

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¹ For more information about the F5 ARX platform, see, "F5 ARX file virtualization and Dell storage," by Renny Shen, in *Dell Power Solutions*, 2010 Issue 2, content.dell.com/us/en/enterprise/dl-business-solutions-power-en/documents-ps2q10-20100355-f5.pdf.aspx.