Automated Switching Completes Data Center Virtualization

By Ken Won

Most IT organizations have implemented server and storage virtualization to some degree, but to fully realize the benefits of virtualization, IT organizations need to consider virtualizing the network. Automated switching is a big step toward creating a dynamic network that improves server and storage virtualization efficiency while reducing the staff resources required to manage data center operations.

The missing layer

Server virtualization has reduced server counts and improved usage efficiency, but it also creates far greater complexity in the data center – rather than a few dozen servers, administrators must now deal with hundreds or thousands of virtual machines (VMs).

As VMs replaced individual servers tied to specific storage resources, storage virtualization became necessary in order to avoid stranding expensive storage space on underutilized storage servers. Storage virtualization can triple the rate of storage utilization so companies get more for their storage dollars.

But the network is the layer between servers and storage, and having a static network means far higher costs for labor in managing interactions between servers and storage.

Driving the dynamic network

For example, new network virtualization capabilities demand a much higher level of activity around managing network connectivity, security and QoS. Whenever a VM is moved, it is necessary to move the VLANs and port profiles associated with that VM. Since today's data centers are managed via separate server, storage, and network administration groups, a request must be made to the network group to move the VLAN and port profile to support a VM migration. This can take hours or even days in a large organization.

A virtualized environment also changes the requirements for the network infrastructure. Virtualized environments have more traffic on the network and greater peaks and valleys in the traffic load, so the network must be designed for higher capacity and the ability to manage through larger peaks and valleys (with bigger buffers on switches).

Virtualization technology has also moved the traditional boundaries of technology, causing problems with administration. For example, many of today's hypervisors include virtual network switches. Virtual network switches are typically managed through the Hypervisor management console, usually by the virtualization manager. This means the virtual part of the network is managed by the virtualization administrator while the physical part of the network is managed by the network administrator. Dual administration roles raise the potential for inconsistent network policies – which could cause problems with network security or performance – as well as delays related to coordinating the activities of the two managers. New standards such as EVB (Ethernet Virtual Bridge) are being created to help address these issues, but the standards are not yet complete, requiring administrators to rethink how they manage virtual environments.

How automated switches help

A high degree of network automation should be implemented in order to ensure that dynamic server and storage changes are not slowed down by the network itself. Implementing an automated, dynamic network layer in the data center stack is a new idea, and several vendors are leading the way toward this practice with automated switches.

For example, today's advanced switches offer a high degree of automation and programmability that can simplify connectivity tasks in a virtualized environment. Rather than requiring network administrators to manually move port profiles and VMs whenever a VM is moved from one server to another, the switch can be programmed to move these resources automatically.

Switches can also be programmed to watch for parameters such as bandwidth, latency, or memory usage to reach certain thresholds, and to notify administrators automatically when this happens. This saves hours of manual monitoring and helps improve overall QoS.

With automated switches in the network, a truly dynamic data center will be easier to manage and far more response to the demands of end users. Network automation ensures that server and storage management changes flow through the data center automatically, making the network itself as virtual and dynamic as the servers and storage attached to it.