

Gaining Research Capabilities Through Network Automation

Customer profile

Industry	Research
Country	United States

Products

- Dell Networking Open Automation Framework
- Dell Networking e1200i switches
- Dell Networking C300 switches
- Dell Networking S55 switches
- Dell Networking S60 switches
- Dell Networking S4810 switches
- Dell Networking C150 switch

Technology challenge

A chemistry research firm needed to automate network provisioning on its new high-performance computing (HPC) system to simplify server and switch deployments, provide plug-and-play switch replacement, and provide easy, location-based host provisioning and replacement.

Solution

The company implemented an HPC cluster connected with Dell Networking switches, along with the Dell Networking Open Automation Framework for automated configuration capabilities.

A global chemistry research company wanted to give its researchers high-performance computing (HPC) capabilities. By choosing to implement internal HPC compute clusters, the company determined that it could improve its ability to do research.

The research firm was already using Dell Networking switches, so it decided to take advantage of the capabilities present in Dell Networking S series switches for deployment and automation, while keeping costs manageable. The firm's compute resources needed an interconnect with a reasonable amount of redundancy, manageability and performance. One of the most important requirements of the compute cluster deployment was that switches should be easy to replace in the field without any pre- or post-configuration work. As a result, technicians could take a switch directly from the box shipped from the factory depot and put it in place, turn it on, and it would configure itself.

The company deployed Dell Networking S60 switches directly into supercomputer racks, where they were connected upstream to a Dell Networking S4810 switch aggregation layer and downstream to hosts that are an integral part of the high-performance computing resources. The S4810s, combined in a VLT stack, were connected upstream to a Dell Networking e1200i switch core that connects to the rest of the network, other compute resources and storage infrastructure. Normal Ethernet hosts, a power distribution unit and lights-out-management network connections in each rack are connected downstream from the Dell S60 switches.

Taking advantage of the bare metal provisioning (BMP) capabilities of the Dell Networking Open Automation

Framework, the firm configured its S4810 and S60 switches for self-installation using a combination of RFC 3046 (DHCP option 82), a startup configuration file determined by the connected uplink switch port, and Open Automation event-triggers. When a switch powers on, it sends a DHCP/BMP request from the management port. The response contains the IP address, subnet mask, and router information, as well as a firmware configuration location that is used to automatically upgrade the switch. In this way, the firm merely needs to update a single location with a new image, and the next time a switch reboots, it automatically re-flashes itself to the indicated firmware.



Dell Networking S4810 switches

Business Benefits

- **Enhancing uptime by automating networking switch installs**

By providing automatic location-based configuration, the Dell Networking switches can be easily and quickly replaced in the event of failure. Also, provisioning new racks is greatly simplified, providing a 90 percent time savings in initial configuration.

- **Centralizing firmware management**

When the company's IT administrators need to upgrade to Dell Networking OS 9 firmware, they simply need to indicate the new firmware level in one location and reboot each switch as maintenance windows permit.

- **Automating configuration tasks to speed new research insights**

Using the Dell Networking Open Automation Framework, the chemistry research firm can automate previously manual tasks. Now, relying on scripting provided by Dell BMP, the firm can automatically add switching paths, change paths or create security protocols as needed. It is no longer necessary for a network engineer to spend time manually configuring each switch. Also, using scripts that are executed at certain times of the day, the company can enable automatic configuration backups. As a result, the company can more quickly enable HPC capabilities that power new insights for researchers.

- **Reducing server deployment time**

In addition to all of the switch configuration being automated, the same location-based deployment is used for supercomputer support servers. The servers get the IP address, name, and other information based upon the S60 switch port they are plugged into.

- **Preventing configuration errors**

For the chemistry research firm, configuration errors are eliminated because the initial configurations are generated once and never changed, with automation taking care of dynamic aspects. Because everything is 100 percent repeatable, manual configurations are a thing of the past.

- **Cutting IT management costs**

The organization is able to reduce some of its IT management costs, because its network engineers no longer need to spend their time managing and configuring networking switches in the HPC cluster. The company has realized additional savings by using the same location-based configuration deployment for subsequent cluster deployments. This means setups are much faster and less error-prone for Ethernet Mac-based configurations, which must always be discovered and then adjusted when replacements are needed.

For further information go to: Dell.com/networking | Dell.com/customerstories

