SearchDataCenter.com
E-Guide

The virtualized enterprise: Top data center and virtualization demands

The virtualized enterprise has changed the game for networking managers everywhere. Many now must take varied paths toward architecting high performance networks. This expert E-Guide discusses the new demands virtualization has placed on the network, how virtual cluster switches eases management and best practices to make the transition smooth.

SearchDataCenter.com
E-Guide

The virtualized enterprise: Top data center and virtualization demands

Table of Contents

Virtual cluster switching: Finding management in a flat network

A basic virtualized enterprise – from 'Network virtualization'

Resources from Enterasys Networks

Virtual cluster switching: Finding management in a flat network

By Michael Brandenburg, Technical Editor

The UCLA Laboratory of Neuro Imaging (LONI) is the very definition of a high-performance computing data center. The lab maps the human brain and continually adds scanned data to the nearly petabyte-sized imaging database, which is constantly accessed by about 1,000 researchers trying to understand and cure diseases like Alzheimer's and schizophrenia. Hundreds of researchers are active at any given time, working with datasets from 20 MB to hundreds of gigabytes.

Like many enterprises that rely on high-performance computing, LONI implemented a non-blocked, flat Layer-2 network with all the racks of servers directly connected. But David Hasson, LONI director of information technology, found that he needed more manageability than a simple flat network could offer -- and the solution to that problem was in virtual cluster switching. Virtual cluster switching is a technology that enables groups of top-of-rack switches to act and be managed as one through a virtual chassis.

"The [flat] network design worked and was manageable, but the problem was that traffic from a single rack of servers could negatively impact the performance of the rest of the data center; and simply figuring out where things were among the racks was a challenge," Hasson explained.

So Hasson invested in Juniper's EX series switches, citing their virtual chassis feature as a big selling point.

"With the virtual chassis, we have the appearance of a flat network, while operating at Layer 3 behind the scenes. Our network topology is actually more complex than in the past. But by managing the rack switches as one or two logical chassis, it is actually easier to manage," Hasson said.

Almost every major networking vendor now offers similar technology under different names, but all with the same aim: to merge disparate switches into a single Ethernet fabric through

a virtual backplane. Some vendors supply devices that use existing 10 GbE ports to create this virtual backplane, while others use a dedicated virtual chassis port.

Data center and virtualization demand flat networks and virtual chassis

The data center network and increase in virtualization place new demands on high-performance Ethernet. In the past, network engineers have turned to modular chassis switches to achieve high-performance Ethernet switching because they could consolidate many ports in one device. Low latency and fast throughput was possible because traffic simply had to traverse the high-performance backplane in the modular chassis. These modular switches were also comparatively easier to administer, with a single management console to manage the myriad of ports.

However, cabling hundreds of server network adapters to a modular switch in its own rack is expensive, so fixed-form-factor, top-of-rack switches have become an easier choice. But this layered approach doesn't lend itself well to a dynamic, virtualized environment.

"An organization could have 90% of its workloads virtualized and still operate on the existing network topologies if they limit the movement of those virtual machines. To see the benefits of virtualization beyond just server consolidation, however, workloads will have to be highly mobile and will need a new type of network," said Zeus Kerravala, senior vice president and distinguished research fellow at Yankee Group. That new network will be a flat, Layer-2 network.

Virtual cluster switching eases management

Within that changed network, one significant benefit of virtual cluster switching is enabling this extra layer of switches to act as one or a few modular virtual chassis switches. The typical enterprise data center has racks of servers, with a pair of top-of-rack switches providing redundancy for each of the server's network connections. Five racks of servers equates to 10 fixed-form-factor switches that each need to be administered and managed. Even if network administrators apply network automation tools to that gear, there is still a fair amount of administration work for each device. With virtual chassis technology, the 10 units could be grouped into two logical switches, cutting management work five-fold.

Beyond the high performance data centers, virtual chassis will also play a central role in enabling management across the enterprise network as glass-housed corporate data centers split apart and become geographically dispersed.

"The fundamentals of network design in an era of emerging data centers are changing," said Rohit Mehra, director of enterprise communications infrastructure for Framingham, Mass.-based International Data Corporation (IDC). "Virtual chassis is a response to dealing with managing infrastructure that is no longer located closely together," Mehra said.

Interoperability concerns remain virtual cluster switching

The downside to most of the cluster switching or virtual chassis solutions available today is the fuzziness of interoperability.

Vendors such as Brocade and Cisco are already releasing virtual cluster-ready switches based on the pre-standard Transparent Interconnection of Lots of Links (TRILL) protocol. But other companies like Juniper Networks Inc. have released their own technology that is not based on the standard.

All vendors, even those building TRILL into their gear, concede that data center products using virtual chassis are optimized when able to operate in a homogeneous network. While a "forklift upgrade" of the data center infrastructure may not be required in every case, networking professionals should be prepared to scour through piles of support documents and implementation guides to make their virtual chassis a reality.

LONI's Hasson and his team have an all-Juniper environment, so interoperability isn't a problem. Yet transitioning to virtual chassis management meant re-educating the networking team on how they viewed the very structure and role of the network. "There was one member of our team who didn't fully understand how the topology worked when we switched, but the fundamentals were sound and I think he finally agreed it was a good way to go," Hasson explained.

Still, the combination of an entire data center network forklift along with teaching brand new network fundamentals might not be an easy transition for many users.

Time to Change the **Blades** on Your Network?

VISIBILITY AND SECURITY WITH ONEFABRIC™ FROM ENTERASYS

With OneFabric, networking for data center mobility will never be the same again. Because now you can automatically provision the network from core to edge. Manage it from a single pane of glass. Secure it, no matter what device people bring with them. And create a confident, stable, secure network. Now you can make everyone happy. Especially you.

Want to learn more?

For more information, call Enterasys Networks toll free at **1-877-801-7082**, or **+1-978-684-1000** and visit us on the Web at **onefabric.net**

enterasys®
Secure Networks™

A basic virtualized enterprise – from 'Network Virtualization'

In this chapter from *Network virtualization*, authors Victor Moreno and Kumar Reddy define the technical requirements posed by the need to virtualize the network. Based on these requirements, they propose an architectural framework comprised of the functional areas necessary to successfully support concurrent virtual networks over a shared enterprise physical network.

Networks enable users to access services and resources distributed throughout the enterprise. Some of these services and resources are public: those accessed over the Internet, and others that are private and internal to the enterprise. Every enterprise has unique security and service level policies that govern the connectivity to the different services, whether these are public or private.

One of the basic building blocks behind the virtualized network and, in fact, a key driver, is security. An important element of an enterprise's security policy is the definition of a network perimeter. In general, the level of trust inside and outside of the network perimeter differs, with end stations inside the perimeter being generally trusted and any access from outside the perimeter being untrusted by default. Communications between the inside and the outside of the perimeter must happen through a checkpoint. At the checkpoint, firewalls and other security devices ensure all traffic that enters or leaves the enterprise is tightly controlled. Therefore, we refer to the point of entry/exit to/from the enterprise network as the network perimeter.

About *Network virtualization*:

Today's enterprises have several groups of users with specific needs. The differences between these groups translate into specific network requirements. Within some organizations, these requirements are so dissimilar that the different groups need to be treated as totally separate customers by the enterprise's IT department. As the number of groups increases, keeping them separate and secure is a challenge to IT departments, particularly with the advent of wireless networks, the requirement for enterprise-wide user

mobility, and the need for cross-group collaboration with resource sharing on a per-project basis.

Network virtualization provides design guidance for virtualized enterprise networks and arms network architects with the background necessary to make sound technological choices in the face of different business requirements. As a means of introduction, *Network virtualization* lays out the fundamentals of enterprise network design. The book builds upon these fundamental principles to introduce the different virtualization methods as the logical evolution of the enterprise network architecture. Detailed descriptions of the technology, design principles, network configurations, and real-world case studies are provided throughout the book, helping readers develop a pragmatic understanding of virtualized enterprise network architectures. Specific examples are included that tailor deployment advice to the small, medium, and large enterprise environment.

Learn how to share network resources and reduce costs while providing secure network services to diverse user communities. *Network virtualization* presents the business drivers for network virtualization and the major challenges facing network designers today. This book also shows how to use virtualization designs with existing applications, such as VoIP and network services, quality of service and multicast. Finally, it provides design alternatives for different real-world deployment scenarios, with configuration examples and case studies.

Resources from Enterasys Networks

Enterasys Announces Fabric Architecture Message: OneFabric

Integrating Physical and Virtual Networking – Virtualized Server Connect to the Data Center Fabric

OneFabric

About Enterasys Networks

Enterasys Networks, a Siemens Enterprise Communications Company, is a premier global provider of wired and wireless network infrastructure and security solutions. Our OneFabric architecture enables enterprises to provision the network from the data center to the mobile edge with consistent performance and enhanced security for business-critical applications, all managed from a single pane of glass.