



Data Center Networking – Managing a Virtualized Environment

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Introduction

There is an industry-wide trend to reduce Total Cost of Ownership (TCO) by improving data center operational efficiencies through server and storage consolidation. This results in better system utilization, application availability and, most importantly, cost savings in terms of both hardware and energy use. For these reasons and others, virtualization technologies are being deployed to drive the efficiency and effectiveness of computing resources.

The movement toward virtualization is forcing enterprises to take a hard look at their data center architecture to ensure they have the automation, visibility and security controls in place to meet the needs of today's demanding business applications.

In addition to implementing new virtualization technologies, organizations are faced with needing to implement new IT organizational processes in order to extend their corporate IT systems to partners, and support new services and applications, such as cloud computing and smartphones. In this atmosphere, companies need to break down the traditional barriers that exist in the IT organization among the server, networking, storage and application teams as a first step to building the dynamic data center.

In this paper, the first of a three part series that addresses key elements of data center networking, we discuss the need for open and highly automated data center solutions that eliminate the complexity associated with network, server and storage provisioning that can plague highly virtualized environments.

Challenges in Today's Data Center

IT organizations are facing a number of challenges as they build out their next generation data centers:

- Decreasing budgets without loss of efficiency
- Needing to dedicate 80% of IT budgets to key applications
- Increased power and cooling costs
- Maintaining application resiliency

Delivering the complete data center network requires unified management of the whole data center fabric, including network, servers, storage and applications. Unified management ensures the data center will have the high availability necessary for critical applications and business data, solving the major issues of today's virtualized data center.

One issue is the need for virtual machine (VM) mobility. IT administrators need to know how many VMs are on the network, when they were deployed and by whom. Discovering which resources were allocated to the VMs and what operating system images they are running becomes even more problematic. To make the provisioning and management of VMs efficient, inventory information must be integrated with network management.

Data center managers also need granular visibility into virtualized environments, with a management view into the tracking of not only VM movement, but also the ability to report on network usage and access.

Finally, compliance is a major concern in today's virtualized data center. IT managers have to be able to manage a virtual network that has inter-connecting VMs, consistently applying network controls across physical and virtual realms, in order to meet compliance requirements such as PCI and Sarbanes Oxley.

Enterasys Virtualization Framework

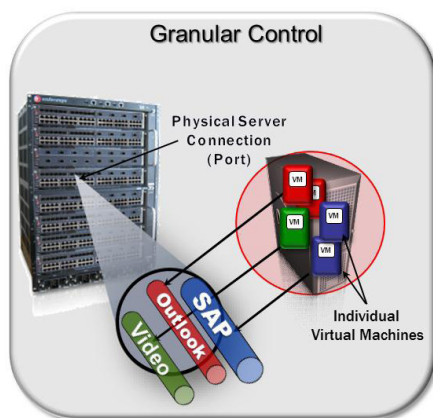
As a starting point to a virtualization initiative, an organization must define the network requirements for its business IT applications, such as video conferencing, Software as a Service (SaaS) or SalesForce.com. These key criteria include:

- Communication path requirements (VLAN, permit/deny IPs, ports, protocols)
- QoS priority (DSCP, 802.1p)
- Enterprise Service Level Agreement (SLAs)
- Bandwidth (rate limiting, rate shaping)
- Compliance requirements

Enterasys solutions offer granular, flow-based visibility and control over individual users, applications and virtual machines. Network-based security, quality of service and bandwidth control of each virtual server in a cluster of physical servers enhances the mobility, flexibility and computing efficiency advantages of data center virtualization, while protecting the confidentiality, integrity and availability of information. Enterasys automates discovery and provisioning of network services for virtual machines, and is able to ensure the quality, mobility and compliance of a virtualized environment. In this way, Enterasys ensures virtualized applications run smoothly and can be moved seamlessly between virtualized machines.

Application Quality: Enterasys S-Series switches provide the granular control and visibility network managers need to gain key insight into both the volume and types of traffic on the network. This provides the IT organization with a tool to help with network sizing and capacity planning, ensuring business application performance.

Figure 1: Granular application visibility via the Enterasys S-Series



Enterasys offers a unique approach to supporting server virtualization. The capability to identify network traffic via a flow-based architecture enables the switch to provision services to VMs. The flow from each VM is identified, and access control, quality of service, rate limiting and rate shaping are applied based on the application's importance.

Most vendors only implement sampled flow monitoring. While the sampled approach is sufficient when multiple flow collectors are distributed throughout the network there are occasions when an inaccurate view of the network can be created by the sampling process or when a network event is not captured during the sample. The result is the network manager does not know where or when an event happened or may not even know that the event happened at all.

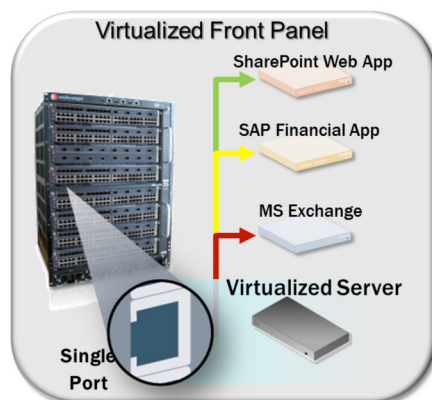
The value with a flow-based switch is in the ability to identify traffic on the network, the devices that are generating the most traffic, and times of the day when the network experiences peak traffic loads. The result is increased visibility for the network manager, who can adjust or fine tune the network to increase performance, remove unwanted or unauthorized protocols or traffic, and plan network capacity increases for the future.

"With the Enterasys S-Series and Network Management Suite, we have a data center solution with self-healing features and built-in redundancy to provide maximum reliability for our network. No other solution comes close to offering the range of capabilities to automatically apply the correct network settings to virtual machines and storage devices as they move within the data center network. This type of visibility greatly reduces the time we spend managing the network, and allows us to provision servers and network services in a streamlined fashion."

- Matthew McEwen, vice president at Stephens Inc.

VM Mobility: Enterasys provides a Virtualized Front Panel on its S-Series switches to enable the re-provisioning of services to virtual machines when they move from one server to another. As an example, consider an SAP financial application that is being moved from one server to another.

Figure 2: Enterasys automatically re-provisions services to virtual machines as they move



Enterasys Data Center Manager (DCM), a powerful unified management offering, automatically recognizes the VM provisioning event and dynamically provisions the virtual and physical switch with the services required by the SAP VM. Enterasys DCM automates what has been a manual process, making the move seamless and consistent. Other vendor switches need to be manually reconfigured for access control, VLAN and QoS before the service is up and running again – a costly and time-consuming process. Enterasys makes this process automated, greatly decreasing operational expenses for IT organizations.

Compliance: Security is a continuing hot button concern when it comes to virtualization. Enterasys solves this problem in a number of ways:

- Restricting access to and from VMs
- Tracking and auditing of VMs on the physical infrastructure
- Securing VM-to-VM communication by grouping VMs into supporting business roles

Enterasys Network Management Suite (NMS) provides built-in security functionality for auditing of data center networks to assist in compliance with PCI, Sarbanes Oxley and other key industry regulations, without the need for add-on appliances. Enterasys compliance solutions provide visibility into the network for administrators to ensure that consistent policies and controls remain in place when moving from physical to virtual environments.

Enterasys Data Center Manager

Delivering network services in real-time in a virtualized environment, [Enterasys Data Center Manager](#) integrates with the [Enterasys NMS](#), bridging the divide between virtual machines and network provisioning applications. Enterasys DCM is a powerful unified management solution that delivers visibility, control and automation over the whole data center fabric, including network infrastructure, servers, storage systems and applications, across both physical and virtual environments.

Enterasys DCM requires no special software or applications loaded onto hypervisors or virtual machines. The solution interfaces directly with the native operating systems. Server and VM visibility and control are provided with no bias to the server or operating system vendor. Enterprises have the freedom to choose the server vendor that best fits their requirements, not the solution that will lock them into a single vendor approach. DCM is unique in the industry in supporting all major virtualization platforms, including Citrix XenServer, Microsoft Hyper-V and VMware ESX/vSphere.

Providing cradle-to-grave visibility into virtualized and physical assets, DCM automates the physical and virtual network configurations for virtual machines. Instead of requiring new software installed on the hypervisor, Enterasys DCM leverages each vendor's APIs and Enterasys published APIs to provide automated inventory discovery and control over the hypervisor switch configuration, as well as management of the physical network configuration.

Benefits of Enterasys Data Center Manager

Automation & Control

- High degree of automation within physical and virtual environments to streamline data center network provisioning
- Predictable behavior and simplified troubleshooting as a result of consistent configuration throughout the network fabric
- Reduced work load and increased efficiency of the IT organization

Visibility

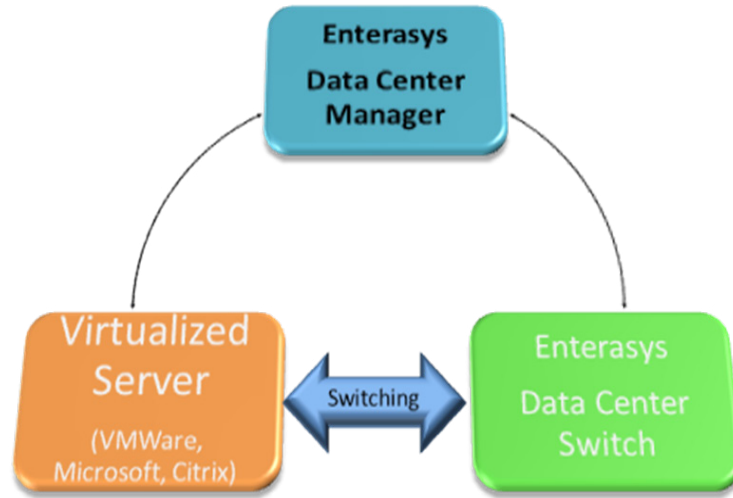
- Better visibility and ability to audit the network via policy-based management
- More granular visibility over traffic and current/historical VM data

Vendor Agnostic

- Open, standards-based approach to work with existing data center infrastructure
- Vendor-agnostic architecture supporting a variety of hypervisor technologies, vSwitches, servers and storage environments
- Adaptable to future technological advancements

Enterasys DCM is designed to reduce IT administrative efforts with the automation of routine tasks and integration of existing management systems. The DCM notification engine provides comprehensive functionality and integrates with the workflows of other alerting tools already in place. Enterprises can leverage and extend existing automated processes to further reduce operational costs. Notifications occur for end-system state changes, newly provisioned VMs and VM motion events. When integrated with a help desk application, the notification can be used to automatically map changes in the infrastructure to actions. Reporting is simple and web-based end-system data views can be generated as PDF files. Managers responsible for monitoring end-system compliance can tailor the views to their preferred format.

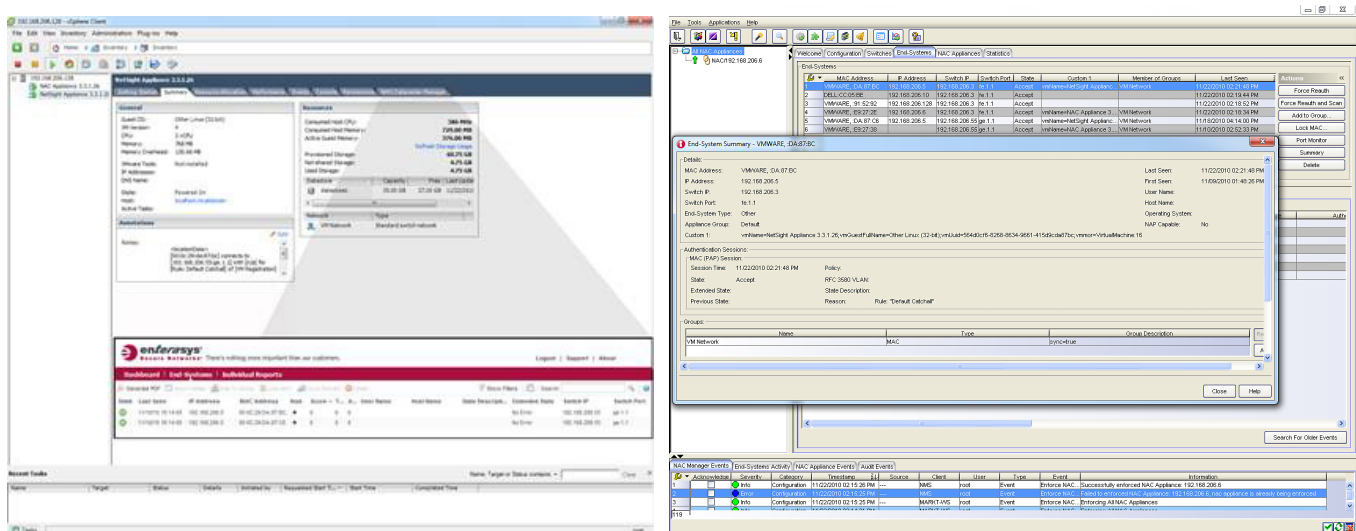
Figure 3: Enterasys Data Center Manager



Breaking Down the Walls in the IT Organization

Servers and network management applications have historically operated as separate islands in the data center. However, the move to virtualization technologies is driving IT organizations to bridge the gap between these islands without additional consoles. Enterasys DCM is unique in offering an integrated view of the data center environment, providing the same console view for both the network team and the server team to gain insight into each other's operations. As illustrated in Figure 4, the server team has insight into network activity via the Enterasys tab on the VMware vSphere console. Likewise, with DCM, the network group has a view into VM movement and server activity.

Figure 4: Seamless end-system visibility across the server and networking environments



Organizational separation between various departments such as network, security and applications/servers make it difficult to create a highly agile and automated operational model. Enterasys DCM addresses this by integrating network and server administration so every team is able to keep their existing operational model in place and gain insight into other teams' activities. Enterasys provides support for the unique APIs of VMware, Microsoft and Citrix, with the flexibility to expand to other platforms due to the open nature of NMS.

When the networking team makes a change, such as setting the QoS for an application, DCM globally provisions the vSwitch and the network switch, in this case the Enterasys S-Series, with the appropriate services delivered to endpoints (VMs). This cuts down on the manual steps needed when the server team puts in a request to the networking team for provisioning a new VM. Instead of the server team needing to issue a ticket and wait for a response from the network group, the change can be automatically applied to the network. In this way, when network configurations are made, communication between the network and vSwitch is greatly improved. Each group has insight across the entire data center – servers, storage and networks. When the networking team makes a change, such as setting the QoS for an application, that change is automatically propagated to the corresponding VM.

This scenario would normally require the coordination among several persons in an IT department, along with virtual machine reconfiguration. DCM automates the manual steps, eliminating timing issues and significantly reducing the potential for configuration errors.

Increased Visibility into the Data Center Network

Key to managing today's virtualized environment is the automatic application of individual and unique network policies to various data objects in the switching fabric, including mobile VM sessions, users, applications and storage traffic. A crucial aspect of Enterasys DCM is its ability to establish network profiles for physical and virtual machines and distribute them within the network fabric, as well as coordinate the profile assignment of virtual machines to ensure consistent delivery of services regardless of the physical location of the VM.

Enterasys DCM delivers the centralized visibility, granular control and automation required for the efficient management of this design. Enterasys DCM is distinctive for granularity that goes beyond ports and VLANs down to individual users, applications and protocols. Built upon open standards, it can integrate with third-party enterprise management platforms, enabling IT staff to avoid time-consuming manual switch-by-switch configuration tasks.

“Our experience in managing a dynamic, virtualized environment helped us understand and plan for the challenges associated with building our new data center. Enterasys solutions provide us with an integrated and comprehensive view of our physical and virtual environment, with the ability to keep track of applications as they move from server to server. This type of visibility greatly reduces the time we need to spend reconfiguring the network and coordinating changes across the IT team, freeing us to focus on higher priority projects such as new application roll-outs.”

– Charles Desourdy, associate CIO for the UMass Medical School

Enterasys DCM delivers policy-based visibility and control over the virtualized data center infrastructure to ensure mission critical applications are delivered reliably, enabling organizations to manage their data center network as a cohesive whole, rather than as a disparate set of individual components. Integrated management of virtual servers, storage arrays and the network infrastructure enable the full benefits of a virtual data center.

Looking Ahead

Today, many enterprises integrate the virtual and physical network via proprietary SOA-based interfaces. However, this area is likely to experience standardization over the next two years. Enterasys fully supports industry efforts such as Virtual Ethernet Port Aggregator (VEPA), which will provide for a unified virtual/physical network experience similar to what is available in traditional server deployments today.

Enterasys DCM, with support for a variety of virtualization vendors, provides customers with a pathway toward a unified network environment while industry standards make their way through the approval bodies.

Conclusion

The data center plays a key role in supporting business applications and an increasingly mobile workforce. With the trend toward consolidation via virtualization and cloud computing, the need for automation, visibility and control is more important than ever before to keep up with the increasing complexity of managing today's virtualized network.

In the end, Enterasys data center solutions combine comprehensive centralized management with high availability services to ensure employees have reliable, secure and easy access to the critical applications housed in the data center network.

Based upon a combination of data center switching and automated management, Enterasys provides a comprehensive framework for a virtualized networking environment, delivering several benefits for customers:

- Improved communication among the server, network, storage and application teams
- Increased business agility, with vendor agnostic support for any virtualization vendor
- Consistent compliance controls across physical and virtual environments
- Automated VM mobility management to reduce VM sprawl

For More Information

- Enterasys data center solutions: <http://www.enterasys.com/solutions/DataCenter.aspx>
- Enterasys Data Center Networking Solution Brief: <http://www.enterasys.com/company/literature/dc-sb.pdf>
- Enterasys Data Center Manager datasheet: <http://www.enterasys.com/company/literature/dcm-ds.pdf>

Contact Us

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