SIMPLIFYING NETWORK ADMINISTRATION IN AN ALCATEL-LUCENT VMWARE VIRTUAL ENVIRONMENT

SINGLE VIEW, SINGLE TOOL VIRTUAL MACHINE MOBILITY MANAGEMENT IN AN APPLICATION FLUENT DATA CENTER NETWORK

STRATEGIC WHITE PAPER

VMware's server virtualization allows IT organizations to use network computing and storage resources more efficiently. But a virtual infrastructure requires a different set of management tools than those used to manage a physical infrastructure. As a result, it is difficult for network administrators to get a consolidated and consistent view of the entire network. Alcatel-Lucent provides a VMware Ready, application fluent data center network solution that supports integration of the VMware vSphere virtualization suite, and simplifies virtual machine mobility management. This paper presents an overview of the Alcatel-Lucent VMware solution. It describes how the solution supports virtual machine mobility and streamlines physical and virtual network management and maintenance processes.

vmware® Alcatel·Lucent Enterprise

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VIRTUALIZED NETWORK MANAGEMENT CHALLENGES

The need for more applications and more data processing capabilities has created a significant challenge in enterprise data centers. To manage the ever-increasing volume of data generated on an hourly basis, information technology (IT) managers must enhance the enterprise network. But integrating more sophisticated and powerful network appliances increases power, space and resource requirements, which, in turn, increases overall costs.

VMware is the global leader in data center virtualization, and allows IT organizations to use network computing and storage resources more efficiently. By collapsing multiple physical servers into virtual machines running on a single host, the cost of server deployment and maintenance can be reduced, and network resources can be dynamically optimized to support changing workloads. Virtualization allows multiple virtual machines to run in isolation, side-by-side on the same physical machine — the host server. Each virtual machine can interact independently with other devices, applications, data and users as if they are separate physical resources. This enables much more efficient and reliable use of server resources because different virtual machines can run different operating systems and multiple applications while sharing the resources of a single physical platform. And because each virtual machine is isolated from other virtual machines, if one fails it does not affect the others. In addition, virtual machines can dynamically migrate between hosts to better use server resources.

But virtualization creates new challenges for network administrators. When virtual machines are used, the physical network must always be synchronized with the virtual network to efficiently provide the connectivity services required by applications in a virtual environment. Unfortunately, a virtual infrastructure requires a different set of management tools than those used to manage a physical infrastructure. As a result, it is difficult for network administrators to get a consolidated and consistent view of the entire network. This lack of visibility makes it difficult for administrators to maintain trouble-free operations in virtualized data centers, particularly when dynamic events, such as virtual machine motion, require immediate network provisioning.

To address the need for more efficient management of virtual network environments, Alcatel-Lucent provides a VMware Ready, application fluent data center network that supports integration of the VMware vSphere virtualization hypervisor. This solution is engineered to support virtual machine mobility and streamline network management and maintenance processes with a:

- **Single pane of glass view**, which simplifies and consolidates network management and virtualization operations
- **Complete correlation view**, which provides visibility between a virtualized environment and network infrastructure management
- **Single efficient workflow**, which enables automation of network infrastructure configuration to follow virtual machine movement, thereby reducing IT operations

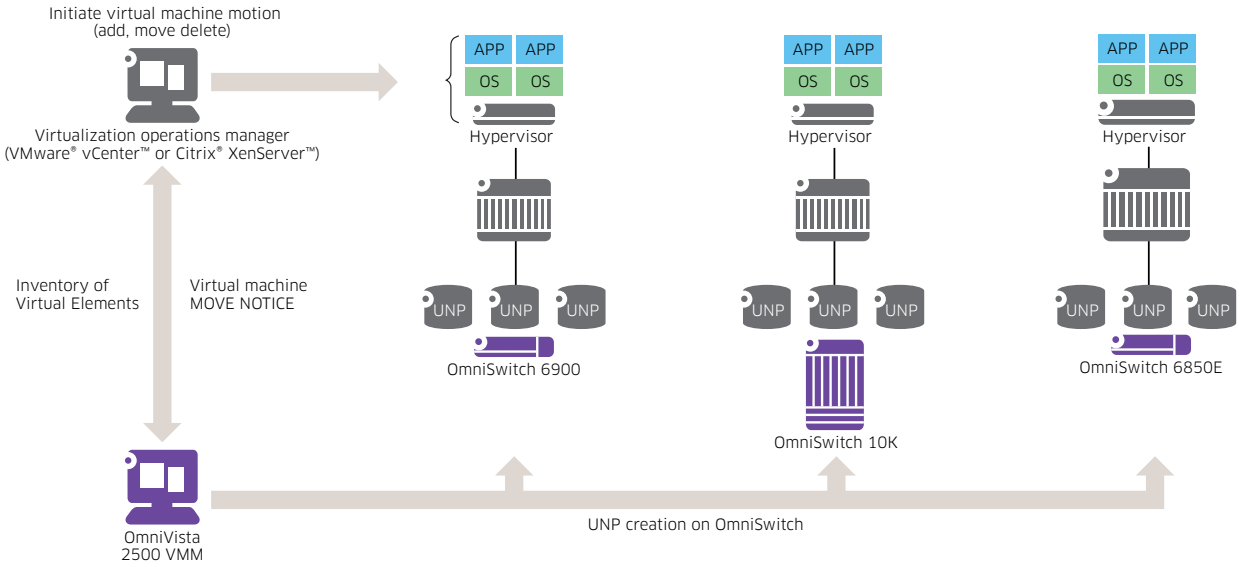
This paper presents an overview of the Alcatel-Lucent VMware solution. It outlines the key features of the solution and the benefits it provides to enterprise data center operators. And it describes how the solution streamlines physical and virtual network management and maintenance by enabling more effective virtual machine location, motion, synchronization and tracking.

ALCATEL-LUCENT VMWARE APPLICATION FLUENT DATA CENTER SOLUTION

The virtualization environment enabled by the Alcatel-Lucent VMware solution is built on two key network management elements (Figure 1):

- The **VMware vCenter Server™**, which provides a centralized and extensible platform for managing a virtual infrastructure
- The **Alcatel-Lucent OmniVista™ 2500 Virtual Machine Manager (VMM)**, which integrates with the VMware vCenter to enable monitoring of all network operations related to a virtual machine life cycle

Figure 1. Alcatel-Lucent VMware application fluent data center network



VMware vCenter Server

The VMware vCenter Server makes it easier for network administrators to manage virtual environments. It provides visibility into the configuration and activity of all components of a virtual infrastructure, and enables centralized management of virtual hosts and machines from a single console. With the VMware vCenter Server, IT administrators can ensure the security and availability of an enterprise network, simplify day-to-day tasks, and reduce the complexity of managing a virtual infrastructure. Service levels can be achieved easily through automated proactive management, which enables dynamic provisioning of new services, balancing of resources and automation of high availability. As a result, a single administrator can manage hundreds of workloads, which is more than double the typical productivity associated with managing a physical infrastructure.

In addition, the open plug-in architecture of the vCenter Server supports a broad range of optional capabilities from VMware and its partners, including capacity management, compliance management, business continuity and storage monitoring. And the vCenter Server application programming interfaces (APIs) also allow integration of physical and virtual management tools for maximum flexibility.

Alcatel-Lucent OmniVista 2500 VMM

The Alcatel-Lucent OmniVista 2500 VMM is an optional component of the OmniVista 2500 Network Management System (NMS). It is engineered to continuously monitor, log and react to virtualization events by tracking virtual machine location in relation to the physical network. This enables network administrators to monitor and control virtual networks and ensure that virtual network policies are consistently and automatically applied across an entire infrastructure. As a result, IT teams can deliver error-free virtual network operation.

The OmniVista 2500 VMM simplifies deployment of value-added services, such as VMware vSphere vMotion® enabled by the deployment of the vCenter Server. It is a VMware Ready offering that integrates with vCenter right out of the box, without additional software components. This reduces capital expenditure (CAPEX) and operating expenditure (OPEX) associated with a typical deployment. In addition, configuration changes are not required in virtualization environments. This reduces IT workloads and eliminates the need to coordinate management efforts across multiple teams.

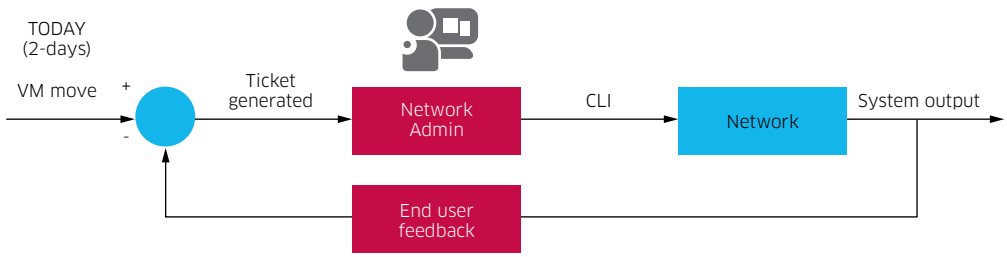
Workloads are further reduced by the OmniVista VMM's automatic network provisioning for virtual machine movements. This automated process establishes definitions for critical parameter settings, such as Virtual Local Area Networks (VL ANs), quality of service (QoS) and security. It also distributes the binding rules between the virtual infrastructure and the data center fabric.

In addition, the OmniVista VMM enables collaborative network management by the virtualization and network infrastructure teams, which respects the requirements and objectives of both. This eliminates configuration conflicts between virtual and physical networks, and increases the efficiency of day-to-day IT operations.

AUTOMATED NETWORK EVENT MANAGEMENT PROCESS

Typically, orchestrating virtual machine data and user service changes in a virtual network environment is a manual process. Surveys show that 57 percent of organizations initiate these change processes through a ticket system. Another 18 percent convey changes, additions, moves, and other adjustments to the network administration team by phone calls, and 13 percent do it by e-mail (Figure 2).[1]

Figure 2. Orchestrating virtual machine changes in a typical network is managed with a manual process



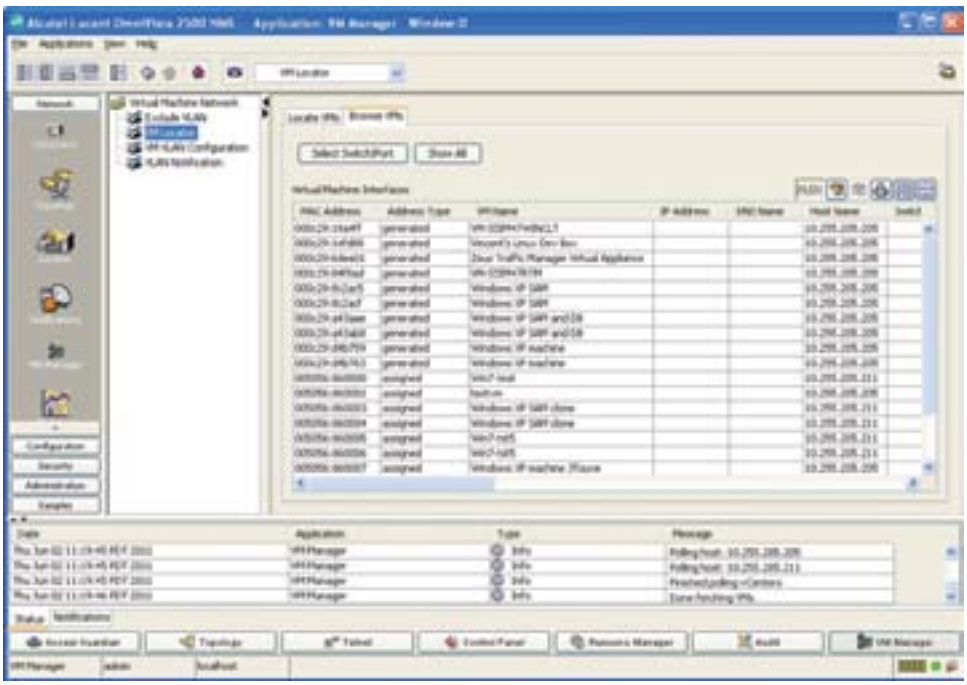
1 *"Breaking Down the Application and Network Infrastructure Silos"*, Andre Kindness, Principal Analyst, Forrester Research, September 2012.

This manual process is time-consuming and inefficient. It involves manual searching and network manipulation by an IT administrator, some level of manual command line input, and a manual process of synchronizing the move with physical network resources. Surveys show that, on average, a typical data center change, such as deploying a server, moving a virtual machine, or setting up an IP address for the server team to use, takes approximately two days. Some enterprises report that in worst case scenarios it may take up to a month.[2]

The Alcatel-Lucent VMware solution eliminates the inefficiencies of manual processes. It provides continuous, real-time visibility of the location of virtual machines in the network, tracks them, and synchronizes their movement with Layer 2-3 and 4-7 data.

With this solution, virtual machines are configured using the VMware vSphere software. The VMware vSphere Client connects to the VMware vCenter, a central service that interfaces with multiple host servers. Through the vSphere Client graphical user interface (GUI), the IT team can manage virtual machines residing on different host servers. To make this process more efficient, the OmniVista VMM interfaces with the VMware vCenter (Version 5.1) to provide a single unified view of the virtual machine network inventory through a GUI interface (Figure 3).

Figure 3. The OmniVista VMM interfaces with the VMware vCenter to provide a single, unified view of virtual machine inventory



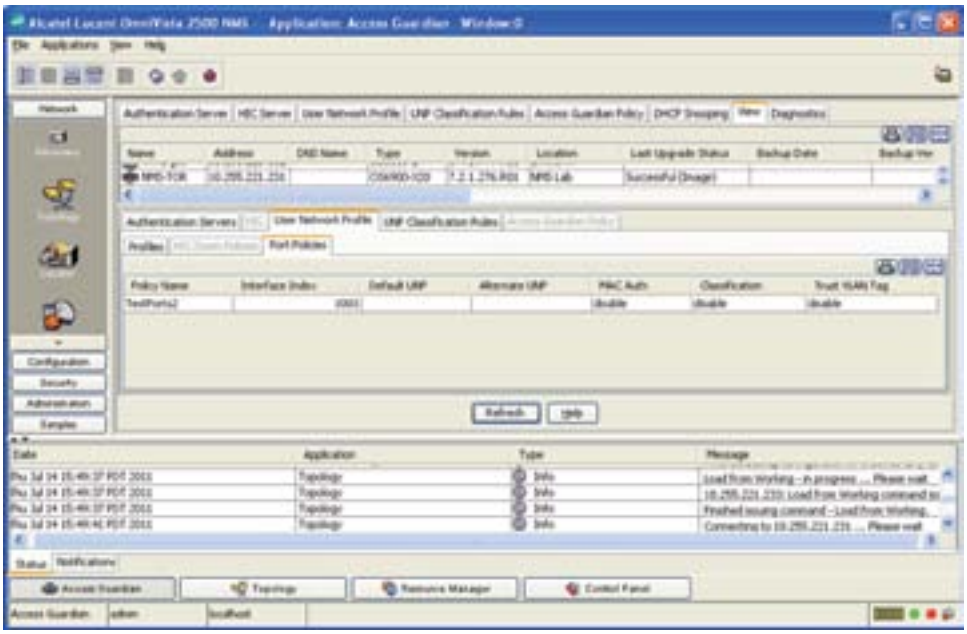
This single view of the virtual network allows IT managers to easily monitor virtual machines, their configurations, and designated switch configurations that enable proper traffic flows. It also enables tracking of virtual machines and their network associations if the machines move to a different host on the network. In addition, the OmniVista 2500 VMM automates network infrastructure provisioning, eliminating configuration conflicts between virtual and physical networks, and increasing the efficiency of day-to-day IT operations.

2 *ibid*

To further streamline virtual machine management, the OmniVista 2500 VMM manages and configures the unique Alcatel-Lucent Universal Network Profile (UNP) feature within the OmniVista Access Guardian application. This simplifies the automatic provisioning and deployment of individual and unique UNPs. It also enables operators to establish UNPs for physical and virtual machine bindings (for example, VLAN Tag Rules, IP Rules, MAC Range Rules), which the OmniVista 2500 VMM distributes across the data center fabric and uses to shape virtual machine traffic.

The OmniVista 2500 VMM also simplifies the definition and setting of critical parameters for Virtual Network Profiles (vNPs), such as VLANs and QoS for applications and network security. In this way, it ensures continuous performance and delivery of services regardless of the physical location of the virtual machines (Figure 4).

Figure 4. The OmniVista 2500 VMM simplifies vNP definition and critical parameters settings



The solution at work

To use the Alcatel-Lucent VMware solution, operators must first create virtual machine port groups inside the host machine's networking configuration. Each virtual machine port group is assigned a virtual machine VLAN (VM VLAN) based on the administrator's specifications. Using UNP tag rules on the switches, operators can then associate VM VLANs with different UNPs and their VLANs.

Once a virtual machine is assigned a virtual machine port group, its network traffic is tagged with a VLAN number, so that a switch will know how handle the tagged packets based on a UNP tag rule. This rule relates a VM VLAN with its corresponding UNP and VLAN on the switch. If UNP tag rules are consistently defined on all the switches that carry virtual machine network traffic, a virtual machine can move between hosts connected to different ports within a switch or different switches — whether they are in the same data center or across the wide area network (WAN) in different data centers — without changes to its switch VLAN and traffic shaping parameters. The new switch will pick up the VM VLAN tag and know how to properly handle the virtual machine's network traffic.

To help with consistency, the virtual machine notifications feature within OmniVista 2500 VMM monitors virtual machine configurations and sends a notification to administrators in the event that a virtual machine configuration is missing. Configured properly, this streamlines the management of virtual machines across an entire data center network.

For example, in a typical data center a physical switch may have multiple virtual machines. Each virtual machine will have a vNP associated with it that defines network-critical parameters, such as QoS, security, priority, and bandwidth. These vNPs are shared with all switches in the data center (Figure 5).

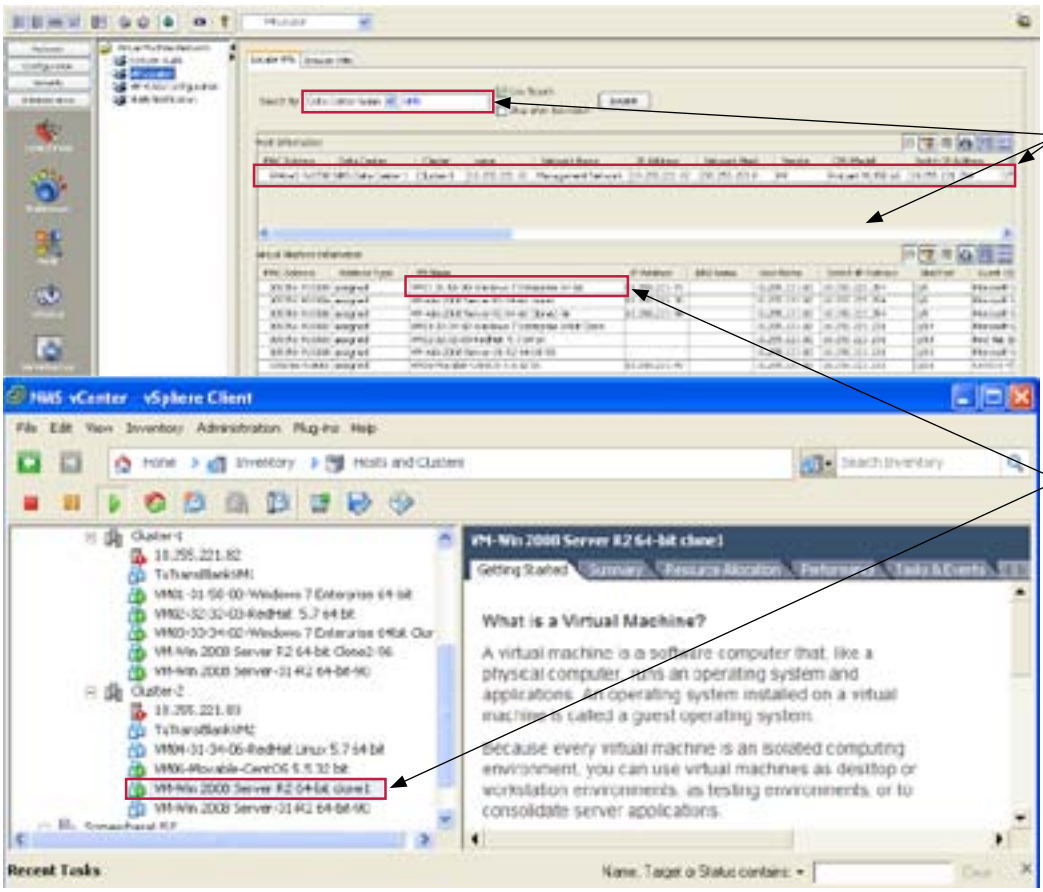
Figure 5. Virtual machines are identified by vNPs shared with all switches in a typical data center

Therefore, when one virtual machine application is moved from one switch to another its entire vNP migrates with it (Figure 6). There is no need to manually reconfigure the switches to support the virtual machine application. The migration is managed automatically and more efficiently compared to traditional manual processes.

Figure 6. When one virtual machine application is moved from one switch to another its entire vNP migrates with it

This process is enabled by the bulk vNP provisioning feature in the OmniVista Network Management platform. With this platform, vNP bulk provisioning can be applied across an entire data center fabric, whether it is in the same physical data center, or two different data centers. As a result, every switch and every port in the data center network has visibility into the vNP. Therefore, when a change or a move is implemented, the profile is logged in two distinct locations, which allows the VMware vCenter and the OmniVista 2500 VMM to track it more easily (Figure 7). As a result, the OmniVista 2500 VMM can automatically track all moves and synchronize them with physical network elements.

Figure 7. By logging a vNP with all switches, the VMware vCenter and OmniVista 2500 VMM can track it more easily in the virtual network

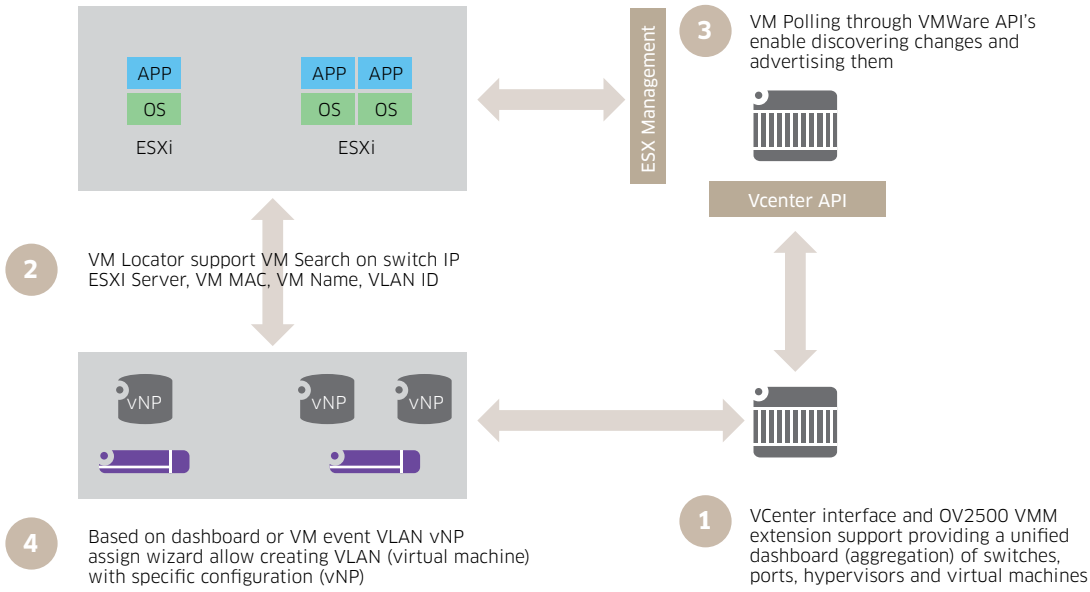


CONCLUSION

The Alcatel-Lucent VMware solution provides a VMware Ready, application fluent data center network that supports integration with the VMware vSphere virtualization suite. It is engineered to support virtual machine mobility and streamline network management and maintenance processes by automatically adapting to virtual machine movement.

With this solution, the OmniVista 2500 VMM does not sit in the control path of hypervisor and virtual machine management system. It attaches itself to the VMware vCenter and reads the information that is available without affecting the network in any way. From this position, it provides a single pane, correlated view of the entire virtual and physical network infrastructure in real time (Figure 8).

Figure 8. Alcatel-Lucent VMware solution provides a single pane of glass view of the virtual and physical network



The single pane view provides a quick, consolidated presentation of the virtual network with a unified dashboard of switches, ports, hypervisors and virtual machines, as well as real-time and historical virtual machine data tracking and logging. This makes it easier for network administrators to maintain visibility of all virtual machine activity at all times and simplifies and consolidates network management and virtualization operations. This standards-based and hypervisor agnostic approach enables automation to be applied to simplify operations for network element discovery and mapping, virtual machine discovery, and virtual machine motion. It provides correlation of network and server viewpoints. And it eliminates the need for formal intervention in the virtual network by a network management system.

ACRONYMS

Term	Definition
APIs	application programming interfaces
CAPEX	capital expenditure
GUI	graphical user interface
IT	information technology
OPEX	operating expenditure
QoS	quality of service
UNP	Universal Network Profile
VLAN	Virtual Local Area Network
VM	virtual machine VLAN
VMM	Virtual Machine Manager
vNP	virtual network profile
WAN	wide area network

REFERENCES

For more information about the Alcatel-Lucent VMware application fluent data center network solution see:

- VMware vSphere Overview

(http://www.vmware.com/products/datacenter-virtualization/vsphere/overview.html)

- VMware vCenter Server Data sheet

(http://www.vmware.com/files/pdf/vcenter/VMware-vCenter-Operations-Management-Suite-Datasheet.pdf)

- Alcatel-Lucent OmniVista 2500 Virtual Machine Manager data sheet

(http://enterprise.alcatel-lucent.com/docs/?id=21170)

- Alcatel-Lucent OmniVista Network Management Solution brochure

(http://enterprise.alcatel-lucent.com/docs/?id=21171)

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