

# The Role of Network Management Systems in Virtualized Environments

## Introduction

The effects of deploying virtualization technologies reach far beyond the parts of the infrastructure that are being virtualized by altering the roles of traditional infrastructure components. Virtualizing servers and desktops changes how organizations go about providing IT services, but also changes how the performance of IT services is being managed across the entire delivery chain. Sixty-two percent of organizations that participated in TRAC's recent survey reported that lack of visibility across the IT service delivery chain is one of the key challenges for managing IT performance in virtualized environments. As a result, organizations are increasingly realizing that ensuring optimal performance of their networks becomes even more important once they have virtualized their infrastructure. Furthermore, managing network performance in virtualized environments requires network management systems (NMS) to be enhanced with a new set of capabilities so they can address key challenges of virtualization management.

This report from TRAC Research analyzes the impact of virtualization technologies on network management and examines capabilities that are becoming increasingly important in virtualized environments.

## Market Context

Network management systems have been present in the market for some time and their primary use has been to provide visibility into network inventory, configuration changes, automate some of the key network management processes and help troubleshoot network performance challenges. NMS is a mature technology and some would say that these solutions have become a commodity. Indeed, the increased complexity of managing IT processes has caused organizations to focus more on the performance of applications and services being delivered over the network, rather than on the network itself. However, the network sits right in the middle of all of the key trends in IT performance management and as a result; the role of NMS solutions in solving infrastructure issues is becoming increasingly important. One of the trends that is significantly changing the dynamics in the NMS market and which is driving the need for innovation and new technology capabilities is deployments of virtualization technologies.

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Deployment of server virtualization technologies increases the importance of effective network management because network performance can and does have a significant impact on how well virtual servers perform. In the case of a physical server, a network issue will only affect the applications running on that specific server, but in a virtual environment, a network issue can affect all of the virtual machines and the applications running in them. As virtual environments grow, applications and their data stores may be spread across multiple physical servers, placing an even greater need for managed network performance.

Use of virtualization management technologies, such as VMware's VMotion, to dynamically add, subtract and move virtual images of servers to balance server load, adjust to changes in demand and ensure that there is maximum utilization of available infrastructure resources adds an additional burden on the network because network connections are being used for these moves, which has a substantial impact on bandwidth utilization. At the same time, the performance of virtualization and capacity management technologies could be significantly affected by network latency and organizations need to have full control over their networks to ensure that the network can support these types of initiatives.

Another area of network management that is affected by virtualization deployments is IP address management. As organizations are moving virtual machines from one physical host to another, they need to assign IP addresses to these resources. Tools for network management play a major role in ensuring that IP addresses are available and that they are used in the most effective way. Migrations of data center elements also require frequent changes in network configuration, which increases the need for the advanced capabilities of NMS solutions to track these changes, in real-time or near real-time, and to automate the process of monitoring the impact of configuration changes on performance.

Additionally, organizations are realizing that deployments of virtualization technologies could have an impact on their ability to have full visibility over their networks. For example, some organizations report that traditional SNMP polling techniques for network monitoring are not as accurate when deployed in virtualized environments. Organizations also find that existing NMS solutions for managing physical environments do not allow them to monitor performance of virtual switches, which hampers their ability to prevent and repair performance issues.

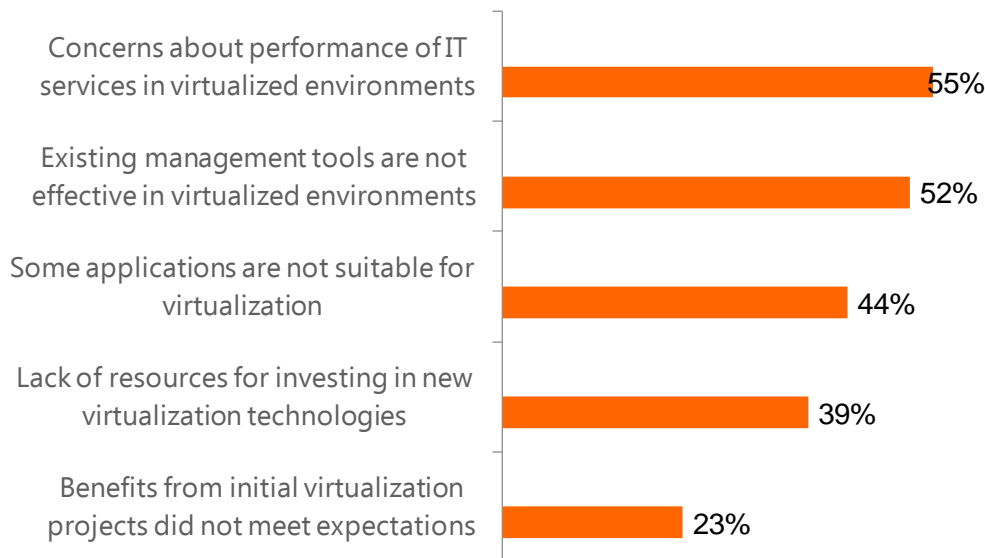
Many NMS vendors have been expanding their products to include capabilities for server and storage management. Integrating this information with network performance data enables them to see across IT "silos" and thus improve their ability to troubleshoot and repair performance issues. However, if NMS solutions don't include the ability to monitor virtual machines, the data collected may not be complete, resulting in a number of false alerts or false positives.

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Desktop virtualization can also have a significant impact on a network's ability to deliver IT services. Deployments of virtual desktop infrastructure (VDI) place an additional burden on the network because data that used to be stored on desktops is now being accessed over the network. As a result, organizations need to have visibility into how VDI traffic affects other applications on the network and the network itself in order to properly manage network resources.

Even though organizations that are deploying virtualization technologies are reporting that they are experiencing significant operational and business benefits from these deployments, many of them are still reluctant to virtualize more of their infrastructures. Figure 1 shows that performance management concerns and challenges are the top reasons why organizations are not able to expand the benefits of virtualizing their infrastructure to new areas.

**Figure 1: Top Organization's Are Not Virtualizing More of Their Infrastructure**



Source: TRAC Research, October 2010

In order to address these challenges and concerns, organizations need to deploy a new set of capabilities that will allow them to have full visibility into the entire IT service delivery chain in virtualized environments.

### Is VM Management Becoming Another IT "Silo"?

One of the key challenges that organizations have been facing around IT management is the lack of capabilities for information sharing between different IT teams. Typically, IT teams, such as network, storage or data center management, have been using management solutions whose capabilities are specific to the area that they are in charge of managing. This led to a lack of visibility into how the performance of an individual infrastructure element is impacting other functional areas of IT and resulted in different teams operating as "silos" with the IT department. At the same time, organizations

are looking to improve the business value of their IT efforts and are increasingly focusing on improving the quality of experience for business users that are consuming IT services. If organizations do not have visibility across different IT "silos" it becomes more difficult to manage the delivery of IT services, as it leads to finger pointing between different IT teams and deteriorates the organizations ability to troubleshoot performance problems in a timely manner.

Even though one of the key promises of virtualization was to help with breaking down these IT "silos", many organizations are reporting that, from a management point, virtualization deployments have actually resulted in creating a new "silo" within the IT. Virtualization projects are impacting not only the performance of infrastructure and applications that are being virtualized, but also impact other infrastructure elements, such as the network. However, virtualization management tools that are being used are still heavily focused on areas of virtualization only, such as capacity planning, resource utilization or availability, and many of them still lack visibility into how virtualization impacts other areas of IT service delivery. Similarly, many VM administrators lack visibility into how the network impacts performance of virtualized infrastructure.

In order to address this issue, organizations should be deploying NMS tools that provide visibility into the key metrics for virtualization management. Additionally, NMS vendors should provide reporting capabilities that would allow VM administrators to access information collected by NMS tools that is relevant for their area of responsibility and enable them to have visibility into network performance.

### Key Capabilities

One of the key tasks for organizations that are implementing virtualization projects is to determine what applications are good candidates for virtualization. The ability to monitor and analyze network traffic, especially traffic based on NetFlow technologies, enables organizations to make informed decisions about applications that are the best fit for virtualization from the perspective of performance and resource utilization.

Even though organizations are virtualizing more of their infrastructures and virtualization projects are moving from lab and testing environments to production, very few of these organizations are planning to fully virtualize their infrastructures. This means that organizations will need to manage a mixed infrastructure of physical and virtual resources. Use of a single platform to manage these resources allows organizations to correlate information about infrastructure components and improves their ability to troubleshoot and repair performance problems. TRAC's research shows that organizations that are using a single platform for monitoring the performance of physical and virtual systems are 84% more likely to reduce time to troubleshoot performance issues as compared to their peers that don't have this capability.

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Organizations also need to enhance not only their network management capabilities, but their ability to leverage information collected by virtualization management solutions for network management purposes. The ability to integrate with the APIs of virtualization management products, such as those from VMware and Microsoft, enables organizations to improve the effectiveness of their network management efforts in support of virtualization projects.

Mapping and discovery of different infrastructure elements is one of the core capabilities of NMS solutions and organizations need to ensure that their network management products include the same functionalities for managing virtualized environments. Discovering interdependencies between physical hosts and virtual machines is a key requirement for managing virtualized environments and NMS solutions could play a major role in addressing this need.

Another important aspect of managing virtualized environments is the ability to perform capacity planning and resource utilization for which many NMS solutions are well positioned. Effective management includes monitoring server availability, CPU, memory, disk usage, and interface traffic for virtual machines and correlating this data with key metrics regarding networking hardware and bandwidth utilization.

Finally, NMS solutions are able to centralize the monitoring of remote network locations and resolve performance issues -- this capability becomes especially important for organizations that are virtualizing their desktops, as it allows them to have visibility into VDI traffic and the performance that users are experiencing at these remote locations.

### Technology Vendors

Many network management vendors are realizing the opportunities that virtualization has created and are enhancing their offerings with capabilities designed to better support virtualized environments. Some of these vendors include:

- *CA Technologies* - enhanced capabilities for network traffic monitoring and dependency mapping in virtualized environments and added new automation functionalities
- *Entuity* - added dedicated support for multiple virtualization platforms and enhanced their capabilities for visibility into network in virtualized environments.
- *HP* - added new capabilities to its Network Node Manager (NNMi) product that includes more visibility into virtual network switches and network connectivity in virtualized environments.
- *IBM* - integrated NMS capabilities as a part of a broader offering for virtualization management
- *Ipswitch* - enhanced capabilities for discovery, mapping and resource utilization in virtualized environments
- *ManageEngine* - added new capabilities for leveraging VMware APIs and expanded a number of virtualization performance metrics

- *SolarWinds* - have been expanding their network management capabilities to provide more visibility into server and storage and collect some of the key metrics needed for effective management of virtualized environments.
- *Quest Software* - added a number of network management capabilities for managing virtualized environments to their Foglight NMS solution including monitoring virtual switches, traffic analysis, dependency and mapping capabilities as well as performance and utilization metrics

### Summary and Key Takeaways

The benefits of virtualizing some or all of an IT infrastructure are well known, but an efficient virtual infrastructure increasingly depends on network performance and reliability. Virtualization projects are increasing the role that the network plays in ensuring optimal delivery of IT services and driving the need for new network management capabilities. The ability to effectively support virtualized environments has become one of the key competitive differentiators in the NMS market and it is driving network management vendors to enhance their offerings so they can provide more value for both network and VM management teams alike.

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