

Managing iSCSI Adapters with VMware vSphere 4.1



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One of the purposes of the SNIA Ethernet Storage Forum is to monitor technology trends in order to provide insights and educational resources to help businesses prepare for upcoming IT investments.

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One of the more impactful IT trends today is the rapid deployment of server virtualization. Server virtualization is being deployed on an almost universal scale to reduce costs and optimize data center resources. To underscore this point, a recent survey* reported several key findings:

- Server virtualization is widely used - 74% of respondents are currently using server virtualization and another 19% are planning deployments.
- The number of virtualized servers is relatively small today - 58% of respondents have virtualized 30% or less of their servers
- The number of virtualized servers is growing - the percentage of virtual machines (VMs) run in production will increase from 39% to 58% within two years

This trend is accelerating with new multi-core servers that support many more VMs per physical server and meet the requirements of resource-demanding, mission-critical applications.

As server capabilities grow, many data centers are finding their 1Gbps Ethernet (GbE) infrastructure is the next limiting factor for server virtualization. The solution is migration to 10Gbps Ethernet (10GbE) and the transition is gaining momentum as prices drop for 10GbE adapters and switches.

Market availability of a 10X improvement in bandwidth is providing added incentive to support network and storage traffic on the same Ethernet infrastructure. Fibre Channel over Ethernet (FCoE) is a new technology to support block-based storage over Ethernet, but iSCSI is the established incumbent. Data centers have several options for 10GbE iSCSI server connectivity and iSCSI storage vendors are shipping 10GbE storage arrays to complete an end-to-end solution.

As part of this next-generation iSCSI environment, VMware introduced support for 10GbE iSCSI adapters with VMware vSphere 4.1. With this new capability, data center administrators may have questions about how to configure, manage and optimize iSCSI adapters with vSphere 4.1. The goal of this article is to provide answers to some of those questions.

iSCSI Adapter Overview

In contrast to using iSCSI software initiators with a network interface card (NIC), iSCSI adapters present two devices per port to the vSphere 4.1 ESX hypervisor - a NIC and an iSCSI adapter. The NIC device can be used for any networking function while the iSCSI device is devoted exclusively to iSCSI storage traffic. The iSCSI device also supports offloading of iSCSI protocol processing from the server to the adapter.

* ESG Research Report, *The Evolution of Server Virtualization* (November 2010)

The NIC and iSCSI devices share the 10Gb bandwidth with a basic deployment and several server vendors provide the option to virtualize the physical port as three NICs and one iSCSI adapter. This allows bandwidth to be individually allocated to each of the four devices.

Separate drivers are required for the NIC and iSCSI functions. In most cases, the best practice is to download and install the most current driver that's available for the adapter, but it's important to confirm that drivers are qualified for the server and storage that will be used.

Configuring iSCSI Adapter with VMware vSphere Client

The iSCSI device appears to ESX as a storage adapter and can be viewed in the vSphere Client under Storage Adapters in the Configuration tab.

The first step is to select Properties and the General tab to enable the adapter and assign the IP address.

The Dynamic Discovery tab can then be used to discover targets based on IP addresses.

The other option is to select the Static Discovery tab and manually enter information for the targets.

After completing setup for the adapter and discovery of the targets, a Virtual Machine File System (VMFS) volume needs to be created on a target LUN. Select a host, click on the

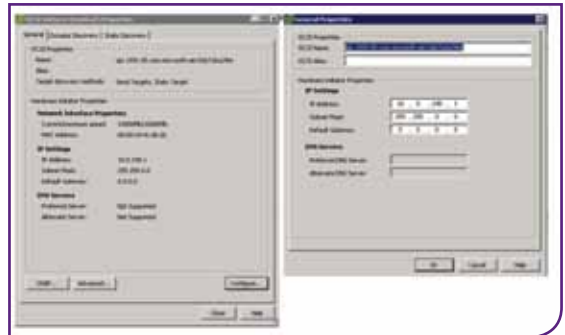


Figure 2. Assigning the IP Address for iSCSI adapter

Configuration tab and choose Storage. Click the Add Storage wizard and select Disk/LUN for the storage type. When the wizard is completed, virtual machines (VMs) can be created on the VMFS datastore.

High Availability

Most 10GbE adapters have two ports, which facilitate support for high availability using multipath I/O (MPIO). Best practices are to use fully redundant paths, including redundant adapters, cables, switches and array ports. If any of the components in the path fails, the host will automatically select another available path. With iSCSI adapters, the only requirement is to have multiple ports connected to the same iSCSI target.

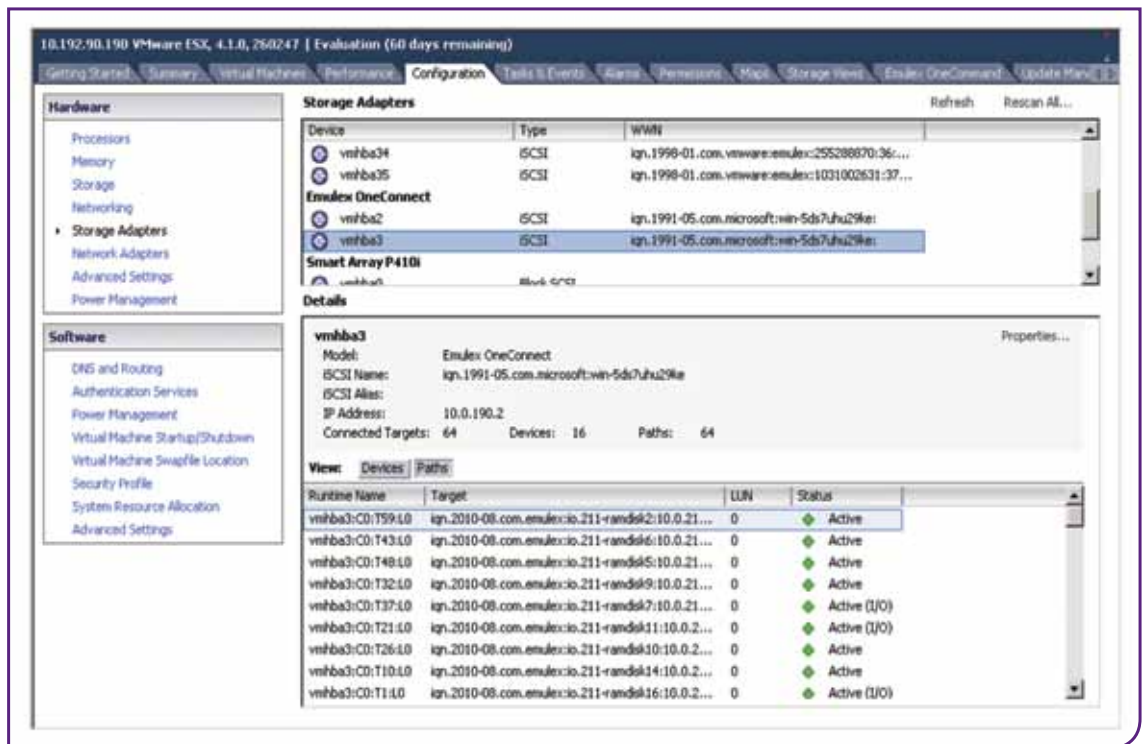


Figure 1. iSCSI adapter listed under Storage Adapters with VMware vSphere Client



Figure 3. Automatic discovery of iSCSI targets

Boot from SAN

Many data centers are deploying servers that will boot the ESX server from a target on the iSCSI storage array. This is particularly beneficial with blade servers that are often configured with no local disk storage. Boot from SAN (BFS) is supported with iSCSI adapters for both ESX and ESXi. The setup will be different for each manufacturer, but the basic procedure is to run software on the adapter to specify the target that will be used to install and boot the ESX hypervisor.

VMware VMotion Considerations

VMware VMotion is a key technology that allows a VM to be moved to a different physical server with no delays in service.

Typical use cases include moving VMs to optimize workloads and to offload VMs for scheduled maintenance. VMotion is fully supported using NICs with software initiators and with iSCSI adapters, and they can be interchanged. For example, VMotion can be used to move a VM running on a server using a software initiator to a server using an iSCSI adapter. The only requirement is that both servers have access to the same-shared storage.

Using VLANs to isolate and optimize iSCSI traffic

A best practice for iSCSI storage includes separation of network and storage traffic. One option is to use separate physical networks. Another option is using Virtual LAN (VLAN) technology to create independent logical networks within a single physical network to isolate iSCSI traffic. Isolating network and storage traffic provides the following benefits:

- Security - Only valid initiators can connect to the target storage array
- Latency - Isolating the storage traffic typically results in a simplified network with fewer routers and associated latency
- Bandwidth - All of the bandwidth can be used for storage traffic without being impacted by other network traffic

All the related components (initiator, switch and target) must include VLAN support when used for iSCSI. In addition to configuring the iSCSI initiator, the VLAN configuration must be applied to switch and target ports in the data path.

Summary

With the release of vSphere 4.1, VMware has added support for 10GbE iSCSI adapters that simplify deployment of iSCSI connectivity for virtualized servers. iSCSI adapters present separate network and storage devices to the ESX hypervisor that can be managed using the VMware vSphere client. They also support key technologies that include high availability, boot from SAN, and isolation and optimization of storage traffic. Server virtualization deployed on new multi-core servers is driving the demand for increased networking and storage bandwidth and this requirement can be met effectively with 10GbE networks and iSCSI storage.

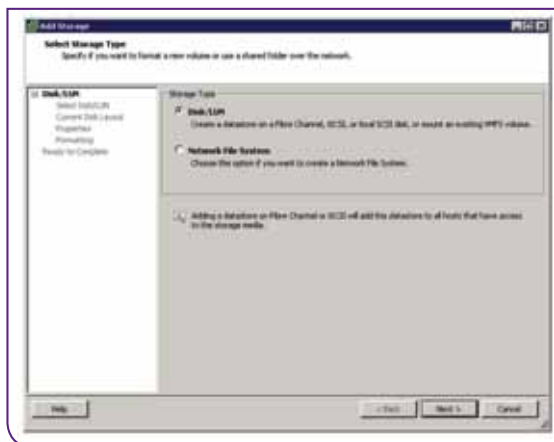


Figure 4. Creating a VMFS volume

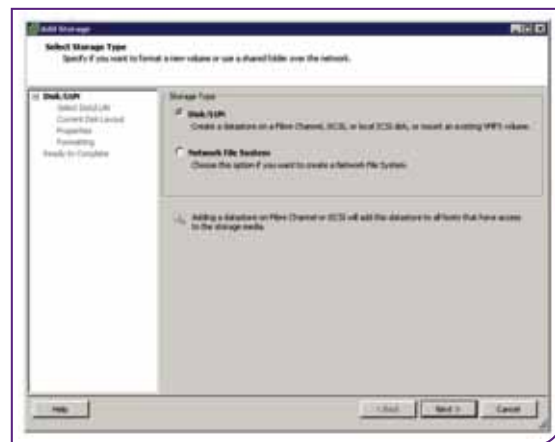


Figure 5. Creating a VM