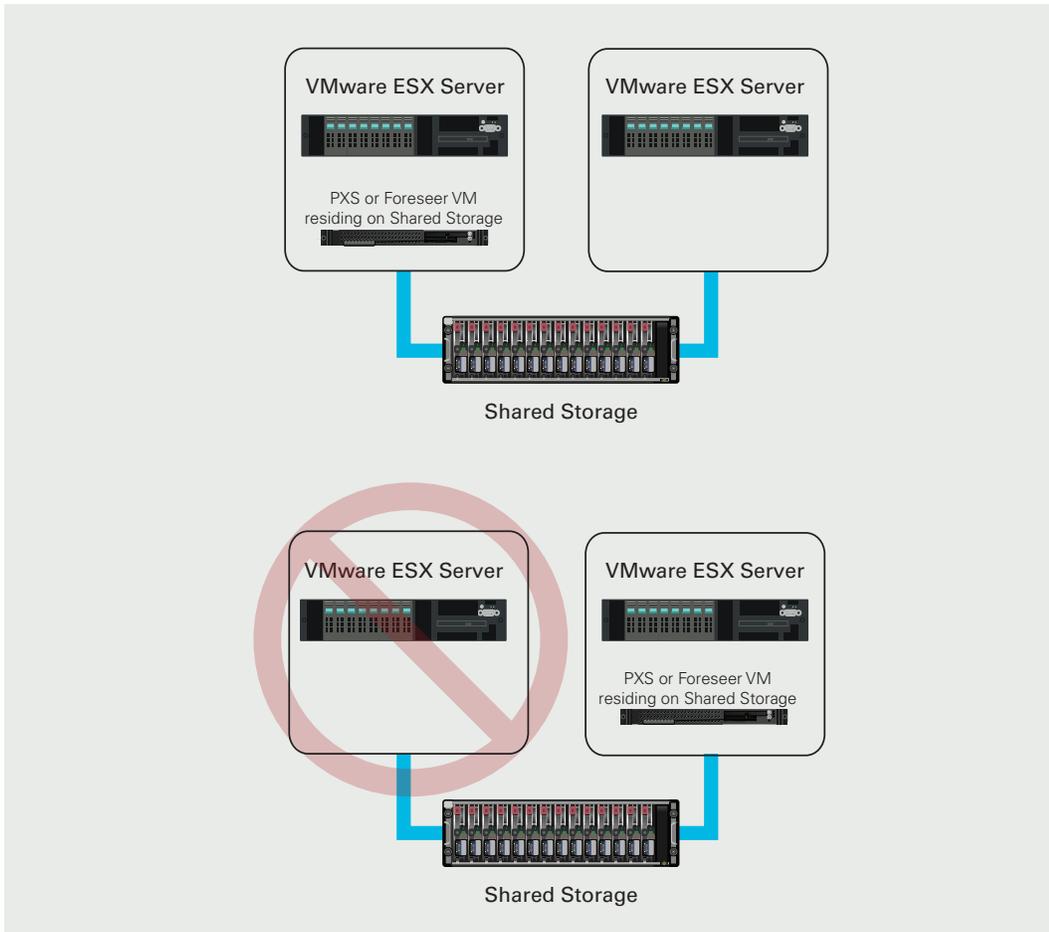


Transparent Failover for Power Xpert® and Foreseer® Software Utilizing VMware® HA Services



This white paper provides a detailed overview on how to set up Eaton Enterprise Power Monitoring Software, such as Power Xpert or Foreseer, for transparent failover functionality utilizing VMware High Availability (HA) solutions.

High availability systems are most typically set up for mission critical computer systems that need to run continuously (24/7). If failures occur, operations are transparently switched over to another computer system allowing the user process to continue to work without interruption.

Key features and benefits

- Failover protection for Power Xpert and Foreseer systems against hardware and software failures
- Proactive monitoring of all physical Power Xpert and Foreseer servers and virtual machines
- Automatic detection of server failure
- Rapid restart of virtual machines affected by server failure
- Optimal placement of virtual machines after server failure
- Scalable availability up to 32 nodes across multiple servers

For detailed information on which cluster system and ESX servers to acquire and how to configure VMware HA services, please refer to the VMware technical document, [Automating High Availability \(HA\) Services with VMware HA](#) or consult your cluster system administrator.

1. Failover Example

This scenario shows PXS or Foreseer virtual machines (VMs) that reside on shared storage and are hosted on individual VMware ESX Servers within a resource pool. VMware ESX servers provide heartbeat information to VMware HA software. Should an ESX server fail, VMware HA detects the failure and automatically restarts the affected virtual machines (including the PXS or Foreseer server VMs) on other available ESX servers within the pool. Servers are selected based on their current available resources and load.



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Eaton Benchmarking Environment

Benchmarking for Power Xpert and Foreseer Software was conducted in the Eaton testing laboratory with a cluster containing two hosts. One host had three virtual machines, one of which had PXS installed and another had both PXS and Foreseer installed. The cluster, host machines, and virtual machines were configured to be enabled for HA.

Benchmarking Results

Power Xpert Software

Eaton ran verification tests for PXS using Power Xpert Toolkit devices, such as the Power Xpert Meter or Power Xpert Gateway, which store trend data onboard. These were connected to a PXS server VM which was subsequently shut down on one host and then restarted on another. In these tests PXS suffered no data loss and it took only three minutes for the PXS services to start on the restarted VM.

PXS with Foreseer

Shutting down the host running a VM with both PXS and Foreseer, and then restarting that VM on another host, had Foreseer services running within three minutes. Even though the devices to which Foreseer was connected had no ability to store trend data, the Foreseer service only lost two trending data points before the service was running again.

HA Benchmark Summary

VMware HA provides simple and inexpensive high availability for PXS or Foreseer running in a virtual machines environment. HA significantly reduces PXS or Foreseer downtime and removes the need for dedicated standby hardware and the installation of additional software.

Recommendations and Best Practices for Eaton Software

There are a few basic requirements that your virtual infrastructure system and hosts need to meet so that the VMware cluster and HA features operate properly.

The screenshot shows the VMware HA administration interface. The 'General' tab is active, displaying the following information:

VMware DRS:	On
VMware HA:	On
VMware EVC Mode:	Disabled
Total CPU Resources:	42 GHz
Total Memory:	47.98 GB
Number of Hosts:	2
Total Processors:	16
Virtual Machines and Templates:	3
Total Migrations using vMotion:	1

The 'Commands' section includes links for: New Virtual Machine, Add Host, New Resource Pool, and Edit Settings.

The 'VMware HA' section shows:

Admission Control:	Enabled
Current Failover Capacity:	1 host
Configured Failover Capacity:	1 host
Host Monitoring:	Enabled
VM Monitoring:	Enabled
Application Monitoring:	Disabled

Links for 'Advanced Runtime Info' and 'Cluster Operational Status' are provided.

The 'VMware DRS' section shows:

Migration Automation Level:	Fully Automated
Power Management Automation Level:	Off
DRS Recommendations:	0
DRS Faults:	0
Migration Threshold:	Apply priority 1, priority 2, and priority 3 recommendations.
Target host load standard deviation:	<= 0.2
Current host load standard deviation:	0.011 (Load balanced)

Links for 'View Resource Distribution Chart' and 'View DRS Troubleshooting Guide' are provided.

2. Example VMware HA administration screen

Cluster admission control setting, current failover capacity and configured failover capacity.

First, for clusters enabled for VMware HA, all virtual machines that Eaton software is installed on and their configuration files must reside on shared storage (Fibre Channel SAN, iSCSI SAN, or SAN iSCSI NAS).

Second, to detect failures VMware HA monitors the heartbeat between hosts on the console network. So, to have reliable failure detection for HA clusters, the console network should have redundant network paths.

Finally, if possible PXS should be connected to Eaton Toolkit devices, such as Power Xpert Meter or Gateways, to guarantee no data loss in case of failover.

References to VMware and Eaton Technical Documents:

- [1] [Automating High Availability \(HA\) Services with VMware HA](#)
- [2] [The Administrator's Guide: PowerXpert Software.](#)
- [3] [The Server Guide: Foreseer.](#)
- [4] [VMware Infrastructure Server Configuration Guide.](#)
- [5] [VMware SAN Configuration Guide.](#)

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Minimum System Requirements

A VMware Cluster with HA consists of VirtualCenter, ESX servers, Virtual Machines vCenter Server:

Processor: Two 64-bit CPUs (Intel or AMD x64) 2.0GHz or faster

Memory: 3GB RAM.

Disk storage: 2GB

Networking: 1Gbit recommended

Database: SQL Express for small deployments (5 hosts/50 VMs) or see below for supported databases.

Operating System:

Windows XP Pro SP2 (SP2 required, 64-bit), Windows Server 2003 (SP1 required, 64-bit), Windows Server 2008 (64-bit), Windows Server 2008 R2

Database:

Microsoft SQL Server 2005 Express

Microsoft SQL Server 2005 Standard/Enterprise edition (SP1, SP2, SP3) 32-bit and (SP2, SP3) 64 bit Microsoft SQL Server 2008 Standard/Enterprise Edition 32 bit and 64 bit

ESX Server

Processor: 64-bit x86 CPUs (64-bit AMD Opterons, 64-bit Intel Xeon, 64-bit Intel Nehalem)

Network Adapter: Broadcom NetXtreme 570x gigabit controllers or Intel PRO 1000 adapters

PXS or Foreseer Memory

2GB RAM minimum (allocate 3 GB of memory to a virtual machine session running PXS)