

Emulex OneCommand Manager Software Evaluation

Evaluation report prepared under contract with Emulex Corporation

Introduction

Emulex Corporation commissioned Demartek to evaluate the ease of installation and use of its OneCommand Manager (OCM) software, and to compare its ease of installation and use against the equivalent software from QLogic Corporation and Brocade Corporation. OneCommand Manager manages host bus adapters (HBAs) and converged network adapters (CNAs) manufactured by Emulex. This evaluation focused specifically on the installation process, applying updates to the adapters and applying adapter parameter settings in a VMware vSphere 4 environment.

Evaluation Environment

This evaluation was conducted at the Demartek facilities in Colorado, using three physical servers running Windows Server 2008 R2 Enterprise (64-bit) and one server running VMware vSphere 4.

Various HBAs and CNAs from each of the three suppliers were installed into the servers and their respective management software applications provided with the adapters were used to manage the adapters. These servers and adapters were connected into two storage fabrics. One storage fabric was an 8 Gb/s Fibre Channel (FC) fabric and the other was a 10 Gb/s Data Center Bridging (DCB) and Fibre Channel over Ethernet (FCoE) fabric. Separate storage target devices were also connected into each of the fabrics.

It should be noted that this comparison did not include the Brocade Data Center Fabric Manager (DCFM) application. DCFM is not bundled with Brocade adapters and must be obtained separately. Two of the three editions of DCFM are available at significant additional cost. DCFM currently provides integrated management of Brocade switches and link-and-launch management capabilities for HBAs and CNAs from Brocade as well as third-party HBA/CNAs.

Evaluation Summary

Our general findings were that for equivalent functions, Emulex OneCommand Manager provided a greater degree of task automation, multi-protocol management, and scalability which can help to streamline management functions within data center environments. We found that with Emulex's adapter management, tasks and application of adapter updates were easier in comparison to the competing adapter management applications from QLogic and Brocade. The architecture of Emulex's OneCommand Manager appears to be geared for efficient deployment and use in a broader range of environments, more so than the other management software applications. Unlike the competitive products, Emulex's OneCommand Manager enables seamless administration of

iSCSI, Fibre Channel (FC), FCoE and NIC adapter functions all from one management interface and one intelligent installation package. It should be noted that Emulex is the only adapter manufacturer that supports all of its current and past adapters with a single management software package.

In our opinion, the Emulex's OneCommand Manager software is a more intuitive, easier to use application which also scales well to accommodate data center growth.

1 – Installation of HBA Drivers and Management Software

The three adapter manufacturers take different approaches to the installation of their management software and drivers. Emulex provides a single package that installs the adapter drivers for HBAs, CNAs and the management software, known as OneCommand Manager. QLogic supplies the HBA and CNA drivers separately from their management software, known as SANsurfer, and each adapter driver is installed separately in addition to the separate installation of SANsurfer. Brocade provides a single package that installs the adapter drivers for HBAs, CNAs and the management software, known as Host Connectivity Manager (HCM).

We installed the full management software application in each of the three servers. The correct adapter drivers were installed automatically for the Emulex and Brocade adapters. Emulex included drivers for all versions of Microsoft Windows operating system. This includes Windows Server 2003 and Windows Server 2008, 32-bit, 64-bit variations. Therefore it is virtually impossible to misconfigure the Emulex adapters at installation time. In addition, the Emulex AutoPilot Installer application performs a qualification check to ensure the operating system is at the correct patch level before commencing with the driver installation process. If the operating system is not at the correct level, then the installation process is interrupted and a corrective action dialogue box appears. With QLogic, we had to manually identify and install the correct adapter drivers in each server for the QLogic adapters before SANsurfer could recognize and work with the adapters.

This level of automation is also important when upgrading drivers. Emulex posts new driver versions as single kits so that when performing a driver upgrade, all Emulex adapters and adapter functions will be upgraded to matching levels in one process. We found this to be a big time saver in data center environments. In contrast, QLogic requires that each driver first be uninstalled and then the new driver must be re-installed for each adapter function. This can be a tedious process; we had to re-install the FCoE driver, the FC HBA driver, the NIC driver, the NIC Teaming driver, and finally the SANsurfer utility. We also found that all of these separate steps made the process prone to user errors. With Emulex, the same process was completed through a single kit and a single step.

In the tests performed in our lab, the installation of the QLogic management software was not as straightforward, demanding a greater amount of the IT administrator's time in order to identify and configure each adapter installed in a particular server. After configuring the first adapter port on each server with SANsurfer, we found that we used a somewhat tedious pattern of having to click "Next" many times in succession to complete the configuration for the remaining adapter ports in that server. In a large environment with many servers and HBAs, QLogic's less than streamlined installation process and the need to manually download drivers ahead of time can become a source of frustration for the time-challenged IT administrators. QLogic's installation process has not significantly changed since the last time we published our evaluation of previous versions of SANsurfer management software in January 2007.

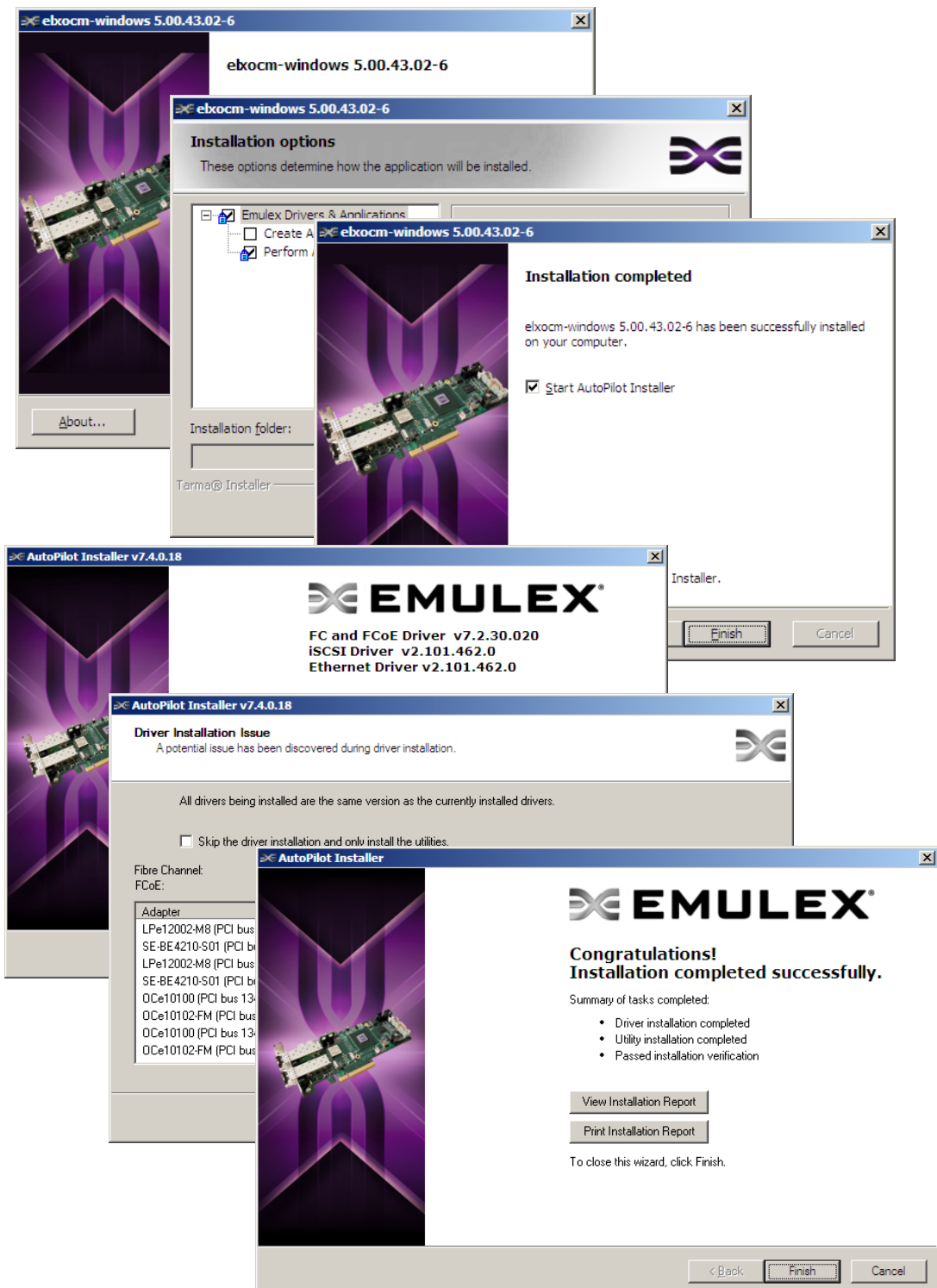
Each of the management software applications can be installed on hosts without adapters from the respective manufacturers. This allows IT administrators to manage adapters in remote hosts from a host system that does not have an adapter. Emulex goes one step further and allows the adapter drivers to also be pre-loaded. Emulex's approach of preloading the entire adapter software stack

allows system images to be taken in preparation for batch deployment to large numbers of servers, greatly reducing management cost and improving time to deployment.

The screen captures on the following pages quantify the steps needed to complete the software installation process for Emulex, QLogic and Brocade adapters.

Emulex OneCommand Manager software and driver installation process

Emulex OneCommand Manager arrives prepackaged and is transparently deployed with the FC, FCoE, iSCSI and Ethernet drivers, within six mouse clicks and taking less than two minutes.



Brocade HCM software and driver installation process

Brocade HCM also arrives prepackaged and bundled with all the necessary software, drivers and adapter firmware. The installation was completed in seven mouse clicks and took four minutes.



QLogic SANsurfer software and driver installation process

QLogic SANsurfer arrives separately from the adapter drivers. Each of the adapter drivers must be downloaded and installed separately. We did note that the latest version of SANsurfer for the FC and FCoE adapters is different from the version of SANsurfer that supports QLogic's current iSCSI adapters. As of this writing, two different versions of SANsurfer are required to manage QLogic's current adapter offerings, one version for FC and FCoE adapters, and another version for iSCSI adapters. The installation of SANsurfer alone (not the drivers) was completed in nine mouse clicks and took two minutes.



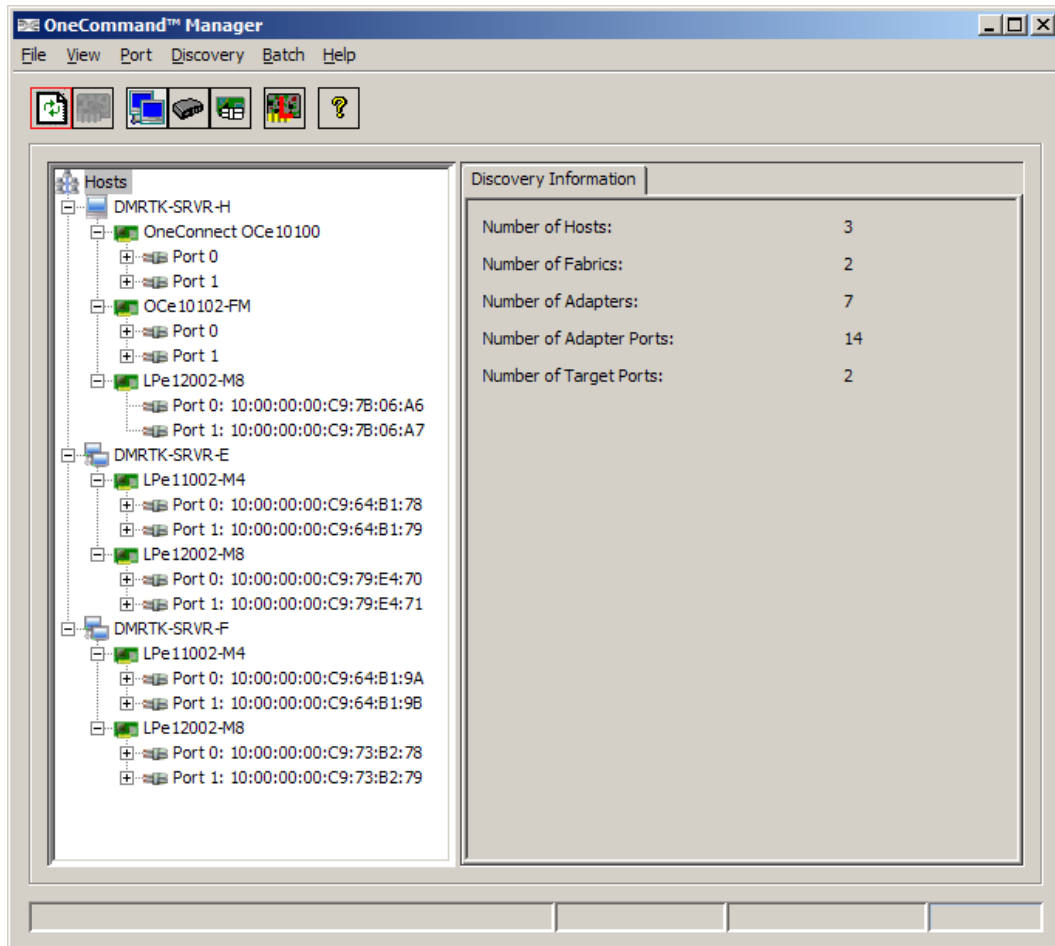
2 – Test Topology

These tests were conducted by installing a variety of adapters from each of the manufacturers into three physical servers in the Demartek lab. Each server was running Windows Server 2008 R2 Enterprise (64-bit). Two separate fabrics were visible to these adapters, one DCB/FCoE fabric and one native FC fabric.

Each test consisted of only one brand of adapter in the servers at a time. The topology information displayed for each brand of adapter is shown below, using their respective adapter management software applications.

Emulex Topology

The Emulex OneCommand Manager topology view provides a list of all the Emulex adapters installed within all visible hosts. In addition, OneCommand Manager also provides a summary of the total number of discovered fabrics, hosts, adapters, adapter ports and target ports.



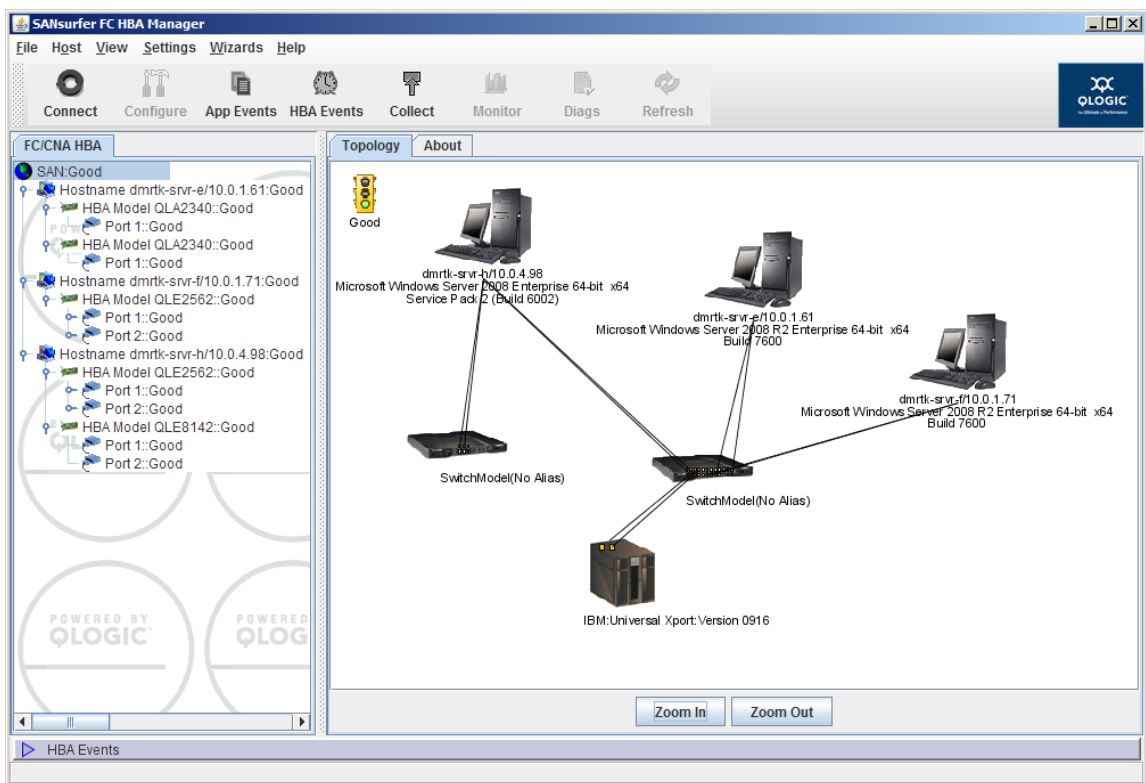
The screenshot displays the OneCommand Manager application window. The left pane shows a tree view of discovered hosts and their adapters. The right pane shows a summary table of discovery information.

Discovery Information	
Number of Hosts:	3
Number of Fabrics:	2
Number of Adapters:	7
Number of Adapter Ports:	14
Number of Target Ports:	2

QLogic Topology

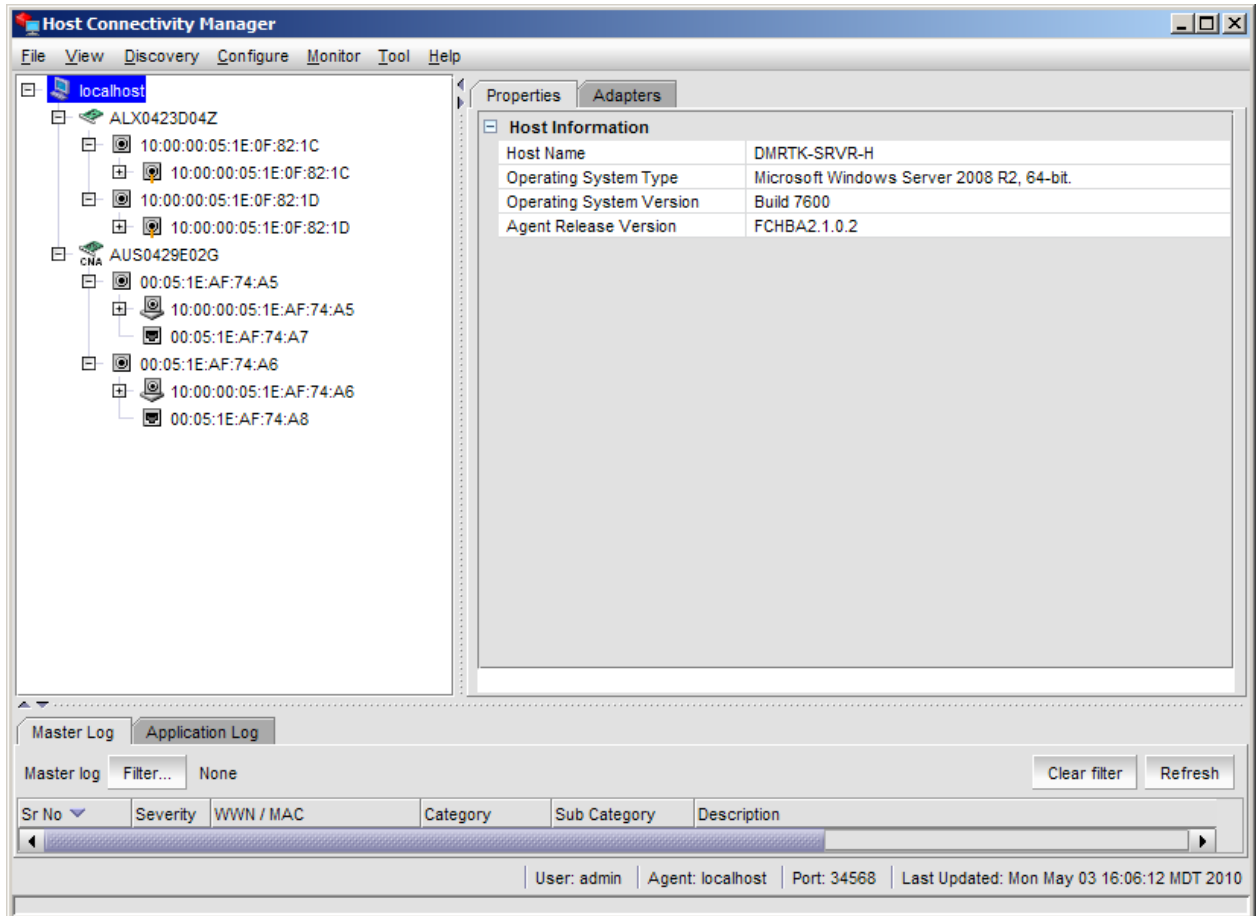
The QLogic SANsurfer topology view lists the visible hosts, adapters and ports, and provides a graphical representation of the fabrics, hosts and targets.

Although we had installed QLogic iSCSI adapters and older 2-Gb/s FC HBAs into the fabric, they were not discovered by this version of SANsurfer. In addition, to discover the iSCSI adapters requires a separate version of SANsurfer to be installed and used. There were also no drivers for Windows Server 2008 R2 for the QLogic 2 Gb/s FC HBAs.



Brocade Topology

Although Brocade's HCM can discover hosts with Brocade adapters, HCM can only display adapter information from one host at a time.



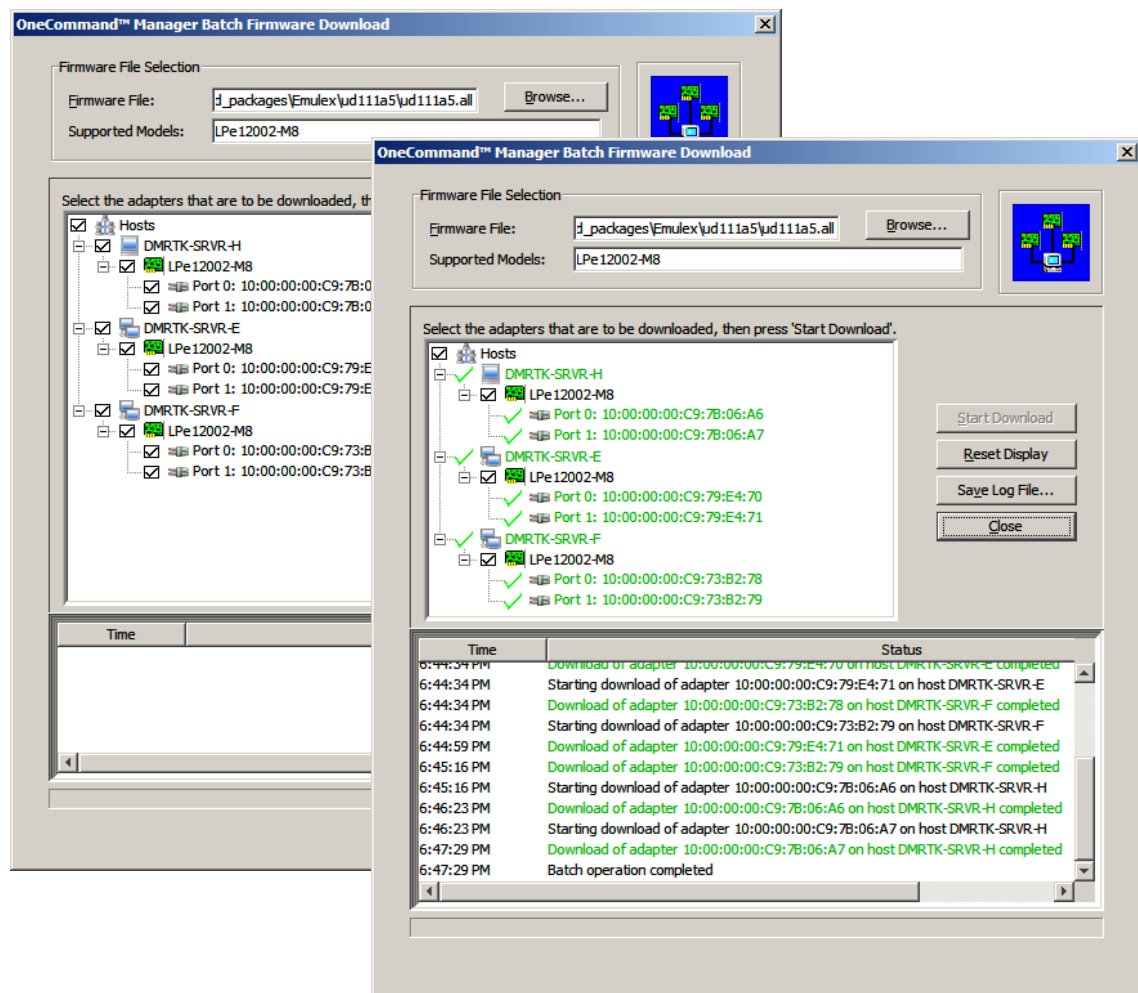
3 – Adapter Update Process

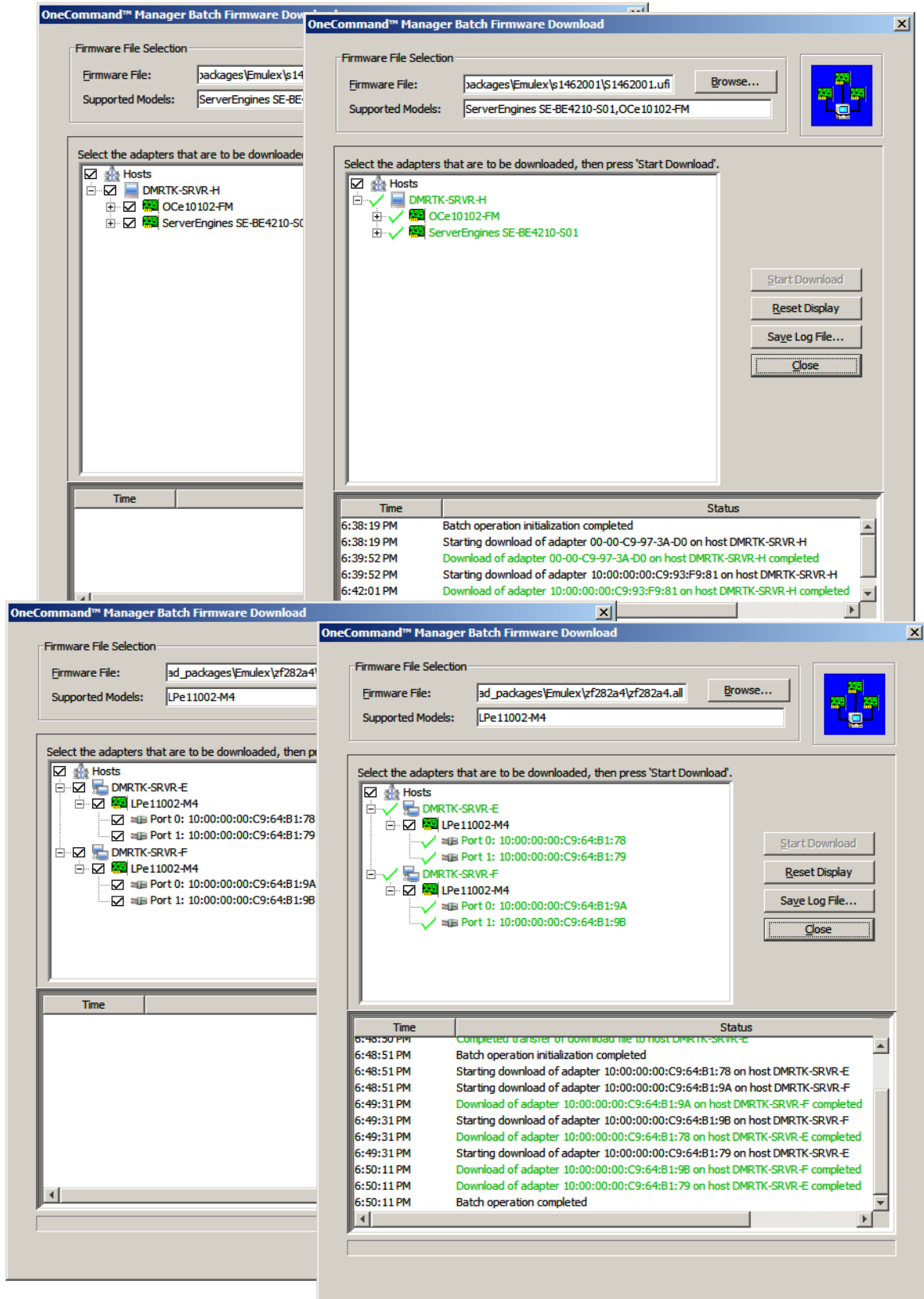
Each of the three manufacturers provides a way to install and upgrade firmware, boot code and/or parameters into their adapters.

Emulex Adapter Updates

We found Emulex’s OneCommand Manager allowed for both firmware and driver parameter updates. Firmware updates can occur individually for each adapter or in a “batch mode” fashion, which runs the updates simultaneously for all similar HBA or CNA models in any or all hosts visible to OneCommand Manager. The firmware is selected, and then OneCommand Manager provides a list of discovered HBAs within the fabric which can use the selected firmware. The screenshots below show the start and finish of this process, including the generated event log. The firmware upgrade process can be initiated from the local host or remote hosts. Three examples are shown, showing different types of Emulex adapters (HBA and CNA) installed in the Demartek servers.

The event log for this process documents the update process for each adapter.





The screenshots show the 'OneCommand™ Manager Batch Firmware Download' application interface. Each window displays the 'Firmware File Selection' section, 'Supported Models', a tree view of hosts and adapters, and a log window at the bottom.

Top-Left Screenshot: Shows the 'Firmware File Selection' section with 'Firmware File' set to 'packages\Emulex\1462001\1462001.ufi' and 'Supported Models' set to 'ServerEngines SE-BE4210-S01'. The host tree shows 'DMRTK-SRVR-H' selected with sub-items 'OCe10102-FM' and 'ServerEngines SE-BE4210-S01'.

Top-Right Screenshot: Shows the same interface with 'Firmware File' set to 'packages\Emulex\1462001\1462001.ufi' and 'Supported Models' set to 'ServerEngines SE-BE4210-S01,OCe10102-FM'. The log window shows the following entries:

Time	Status
6:38:19 PM	Batch operation initialization completed
6:38:19 PM	Starting download of adapter 00-00-C9-97-3A-D0 on host DMRTK-SRVR-H
6:39:52 PM	Download of adapter 00-00-C9-97-3A-D0 on host DMRTK-SRVR-H completed
6:39:52 PM	Starting download of adapter 10:00:00:00:C9:93:F9:81 on host DMRTK-SRVR-H
6:42:01 PM	Download of adapter 10:00:00:00:C9:93:F9:81 on host DMRTK-SRVR-H completed

Bottom-Left Screenshot: Shows the 'Firmware File Selection' section with 'Firmware File' set to 'ad_packages\Emulex\zf282a4\zf282a4.all' and 'Supported Models' set to 'LPe11002-M4'. The host tree shows 'DMRTK-SRVR-E' and 'DMRTK-SRVR-F' selected, each with 'LPe11002-M4' sub-items and their respective ports.

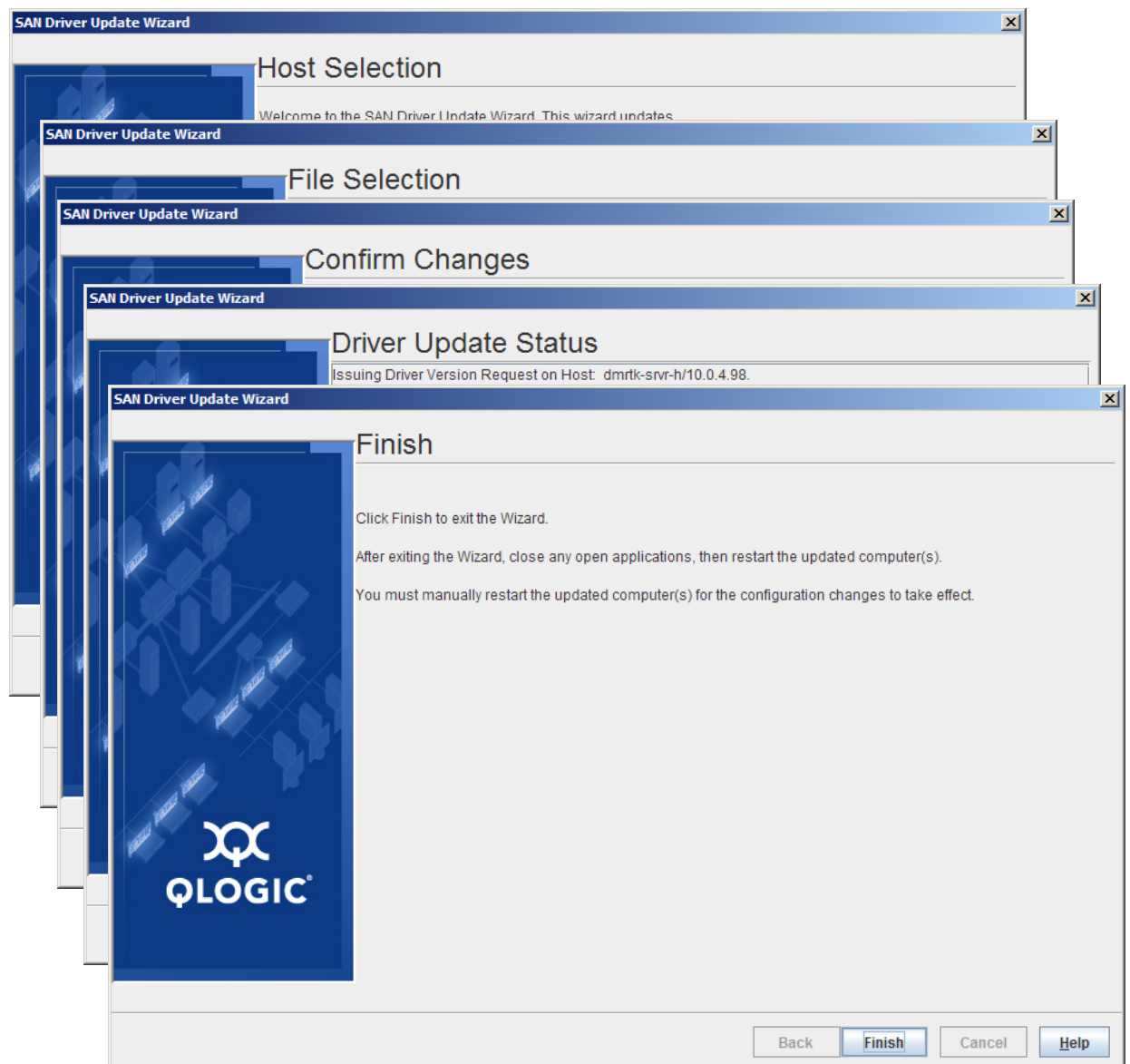
Bottom-Right Screenshot: Shows the same interface with 'Firmware File' set to 'ad_packages\Emulex\zf282a4\zf282a4.all' and 'Supported Models' set to 'LPe11002-M4'. The log window shows the following entries:

Time	Status
6:48:30 PM	Completed transfer of download file to host DMRTK-SRVR-E
6:48:51 PM	Batch operation initialization completed
6:48:51 PM	Starting download of adapter 10:00:00:00:C9:64:B1:78 on host DMRTK-SRVR-E
6:48:51 PM	Starting download of adapter 10:00:00:00:C9:64:B1:9A on host DMRTK-SRVR-F
6:49:31 PM	Download of adapter 10:00:00:00:C9:64:B1:9A on host DMRTK-SRVR-F completed
6:49:31 PM	Starting download of adapter 10:00:00:00:C9:64:B1:9B on host DMRTK-SRVR-F
6:49:31 PM	Download of adapter 10:00:00:00:C9:64:B1:78 on host DMRTK-SRVR-E completed
6:49:31 PM	Starting download of adapter 10:00:00:00:C9:64:B1:79 on host DMRTK-SRVR-E
6:50:11 PM	Download of adapter 10:00:00:00:C9:64:B1:9B on host DMRTK-SRVR-F completed
6:50:11 PM	Download of adapter 10:00:00:00:C9:64:B1:79 on host DMRTK-SRVR-E completed
6:50:11 PM	Batch operation completed

Emulex's driver parameter update function allows users to create a master driver parameter file that can be deployed SAN-wide via a similar batch process as the batch firmware download. Users can configure HBA driver parameters to their specific needs, and save the configuration to a file that can be selected during the driver parameter update process. OneCommand Manager will then present a list of HBA ports that match the driver and HBA type of the master file. This allows users to select the specific ports and apply the driver parameters.

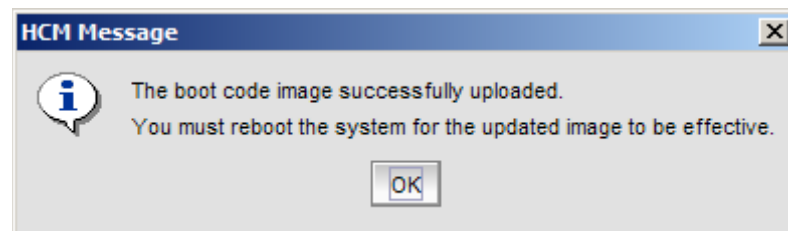
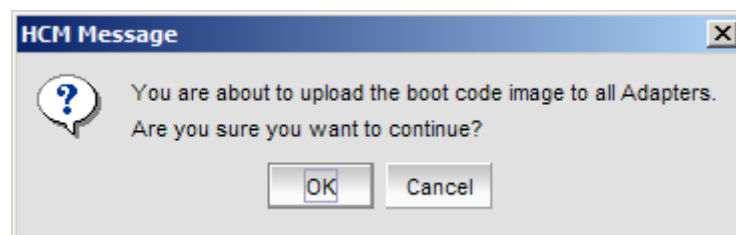
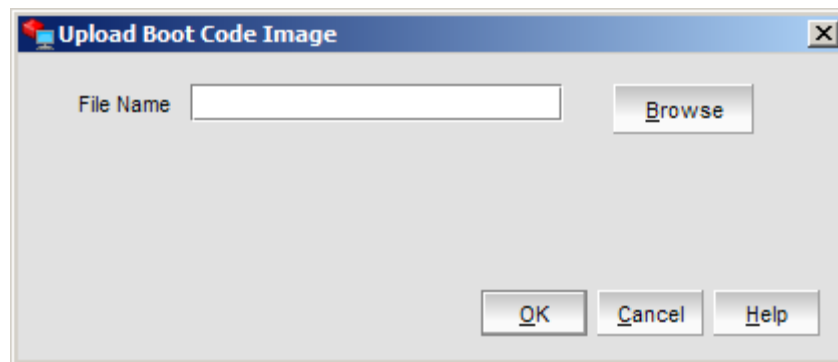
QLogic Adapter Updates

SANsurfer provides a method to apply flash updates, driver updates, parameter updates and other updates to all visible adapters. A different wizard is used for each type of update, which steps through the process of application of the updates. The steps for the driver update are shown below, which resemble the steps to updating parameter, flash, and other updates. The updates for some adapters may require reboots.



Brocade Adapter Updates

Brocade bundles the adapter drivers and firmware together so there is no need to update these separately. However, Brocade HCM does provide a way to separately update the boot code on its adapters. Although the process is straightforward, there is no “batch update” capability, requiring the IT administrator to apply adapter updates one server at a time.



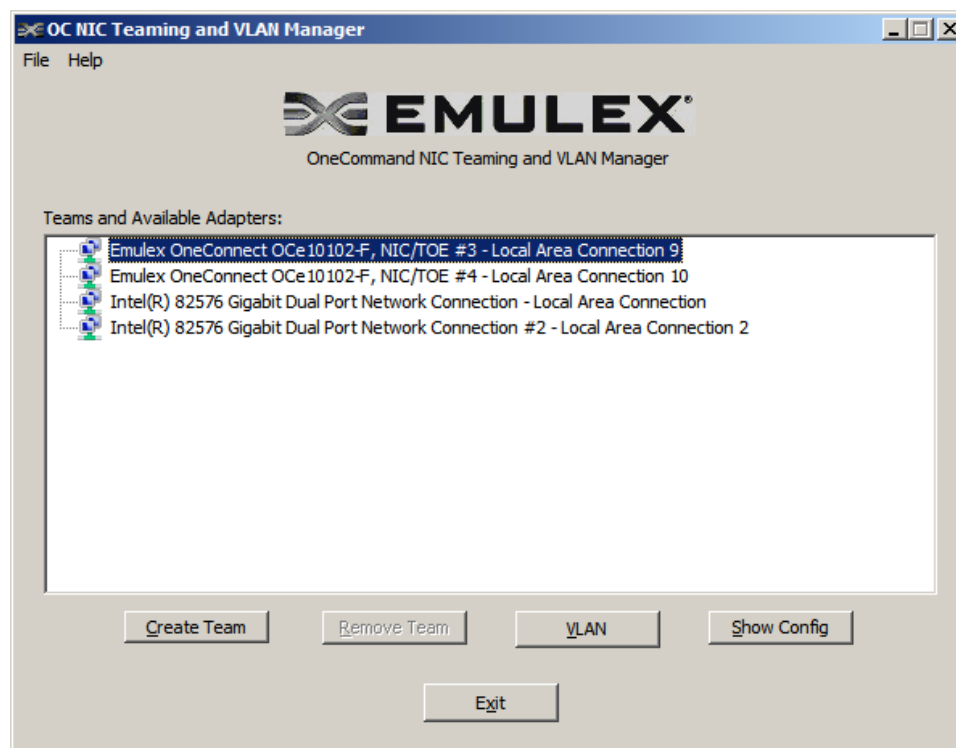
4 – NIC Teaming

NIC teaming, also known as link aggregation, network bonding or port trunking, is the concept of binding two or more NIC ports together causing them to act as one logical NIC port with some form of load balancing or failover across the physical ports. With NIC teaming, there is one IP address for the logical NIC port.

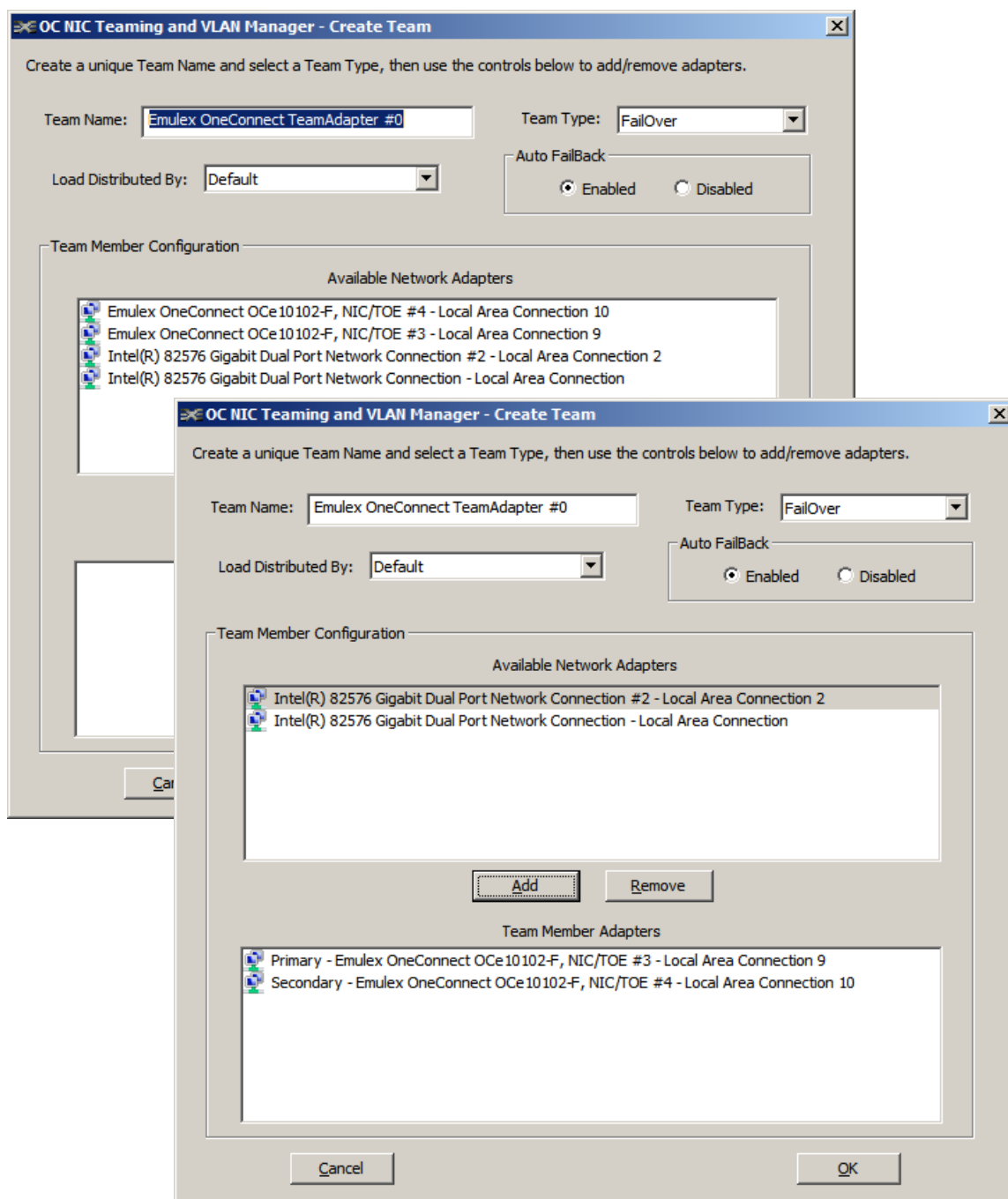
Bandwidth aggregation is accomplished via the 802.3ad specification known as Link Aggregation Control Protocol (LACP). This protocol allows several adapter ports to be bundled together to form a single logical port. The Ethernet switch ports must also support Link Aggregation.

Emulex

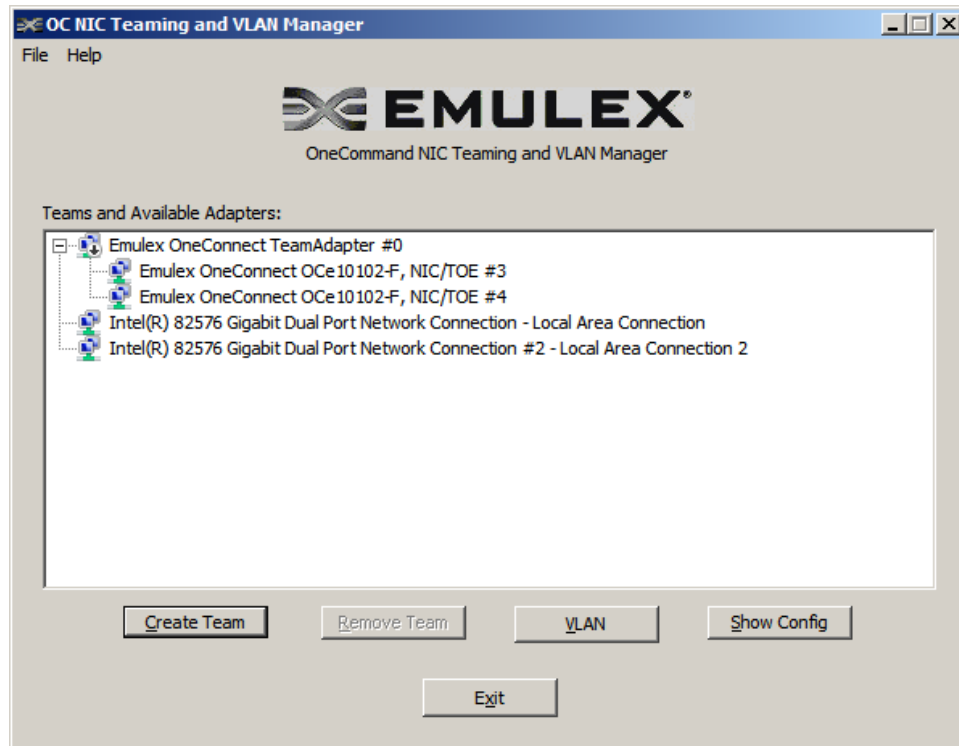
When OneCommand Manager is installed, a second application called the OC NIC Teaming Manager is automatically installed. This application provides all the NIC Teaming configuration functions, as shown below. In the example below, an Emulex UCNA is installed into a Windows Server that has two motherboard 1Gb/s NIC ports. The OC NIC Teaming manager sees not only the Emulex UCNA but also sees other NIC ports in the system and is able to team non-Emulex NIC ports.



In the example on the following page, a team is created using the two Emulex UCNA ports in failover mode.



The two Emulex UCNA ports are selected, then the type of team is selected, and finally the team is created. After the team is created, the main OC NIC Teaming Manager screen is displayed showing the newly created team along with the other NIC ports in the server.

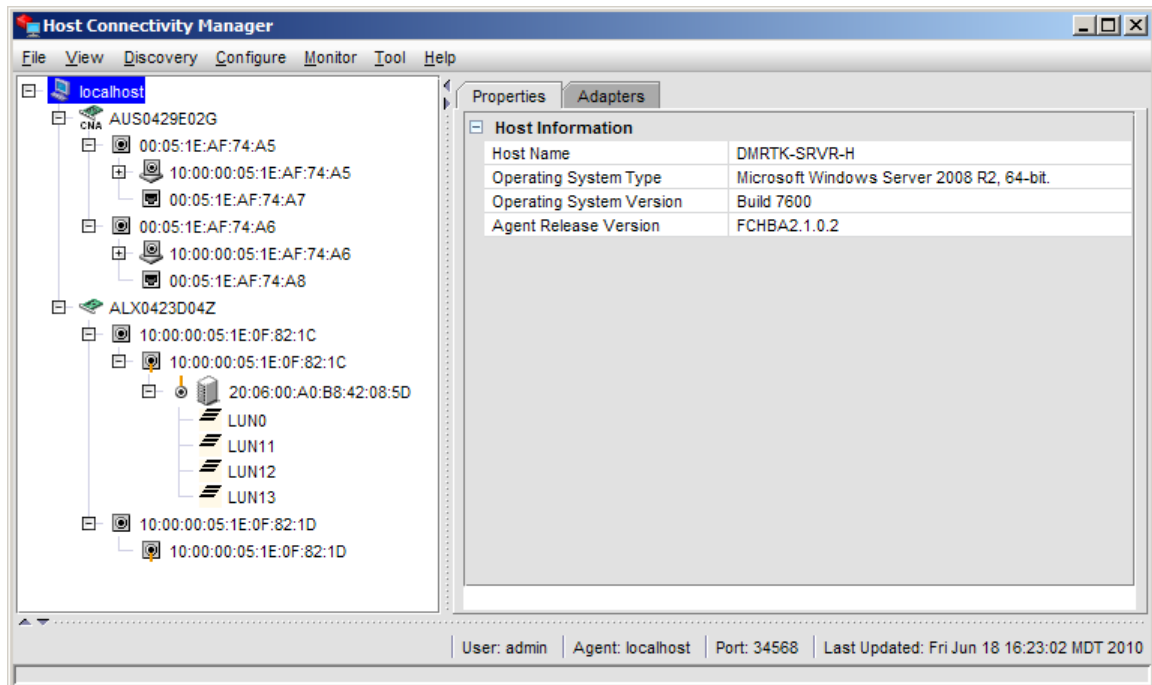


The NIC teaming process for the Emulex adapters is a straightforward process.

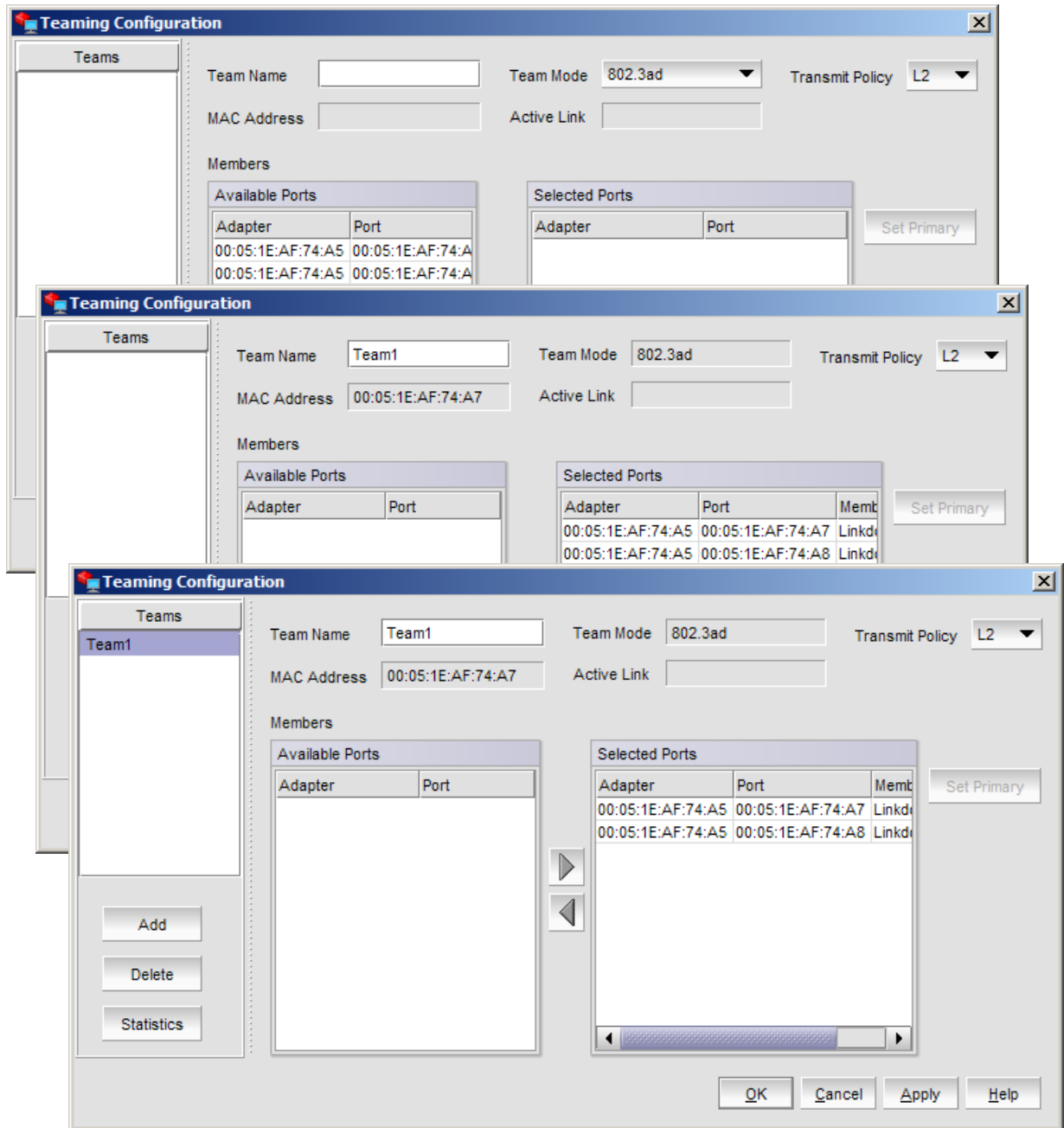
Brocade

NIC teaming is available for the Brocade CNAs for Windows systems only, as specified in the Brocade documentation. To configure teaming, the Teaming selection from the Configure menu is selected.

Brocade HCM teaming functions allow up to eight ports to be teamed and operate in failover, failback or 802.3ad (dynamic) LACP modes. FCoE traffic is not supported in LACP mode.



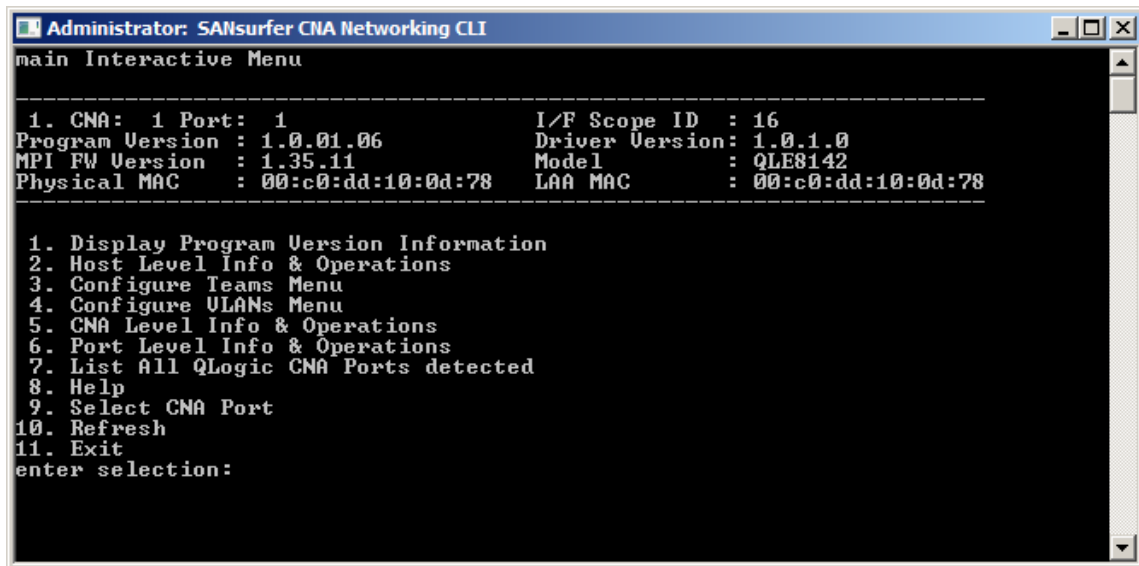
The Brocade NIC teaming function sees only the Brocade CNA ports and does not see other NIC ports that might be available in the server.



The team name, teaming mode and desired ports for teaming are selected and added to the team in a straightforward manner. In the example above, we chose 802.3ad mode.

QLogic

QLogic NIC Teaming is only available with the SANsurfer command line interface (CLI) and appears to be missing many fundamental features, such as Multi-VLAN support and LACP mode. Before teaming can be configured, the NIC teaming driver must be installed via the choices provided in the CLI.



```
Administrator: SANsurfer CNA Networking CLI
main Interactive Menu
-----
1. CNA: 1 Port: 1 I/F Scope ID : 16
Program Version : 1.0.01.06 Driver Version: 1.0.1.0
MPI FW Version : 1.35.11 Model : QLE8142
Physical MAC : 00:c0:dd:10:0d:78 LAA MAC : 00:c0:dd:10:0d:78
-----
1. Display Program Version Information
2. Host Level Info & Operations
3. Configure Teams Menu
4. Configure VLANs Menu
5. CNA Level Info & Operations
6. Port Level Info & Operations
7. List All QLogic CNA Ports detected
8. Help
9. Select CNA Port
10. Refresh
11. Exit
enter selection:
```

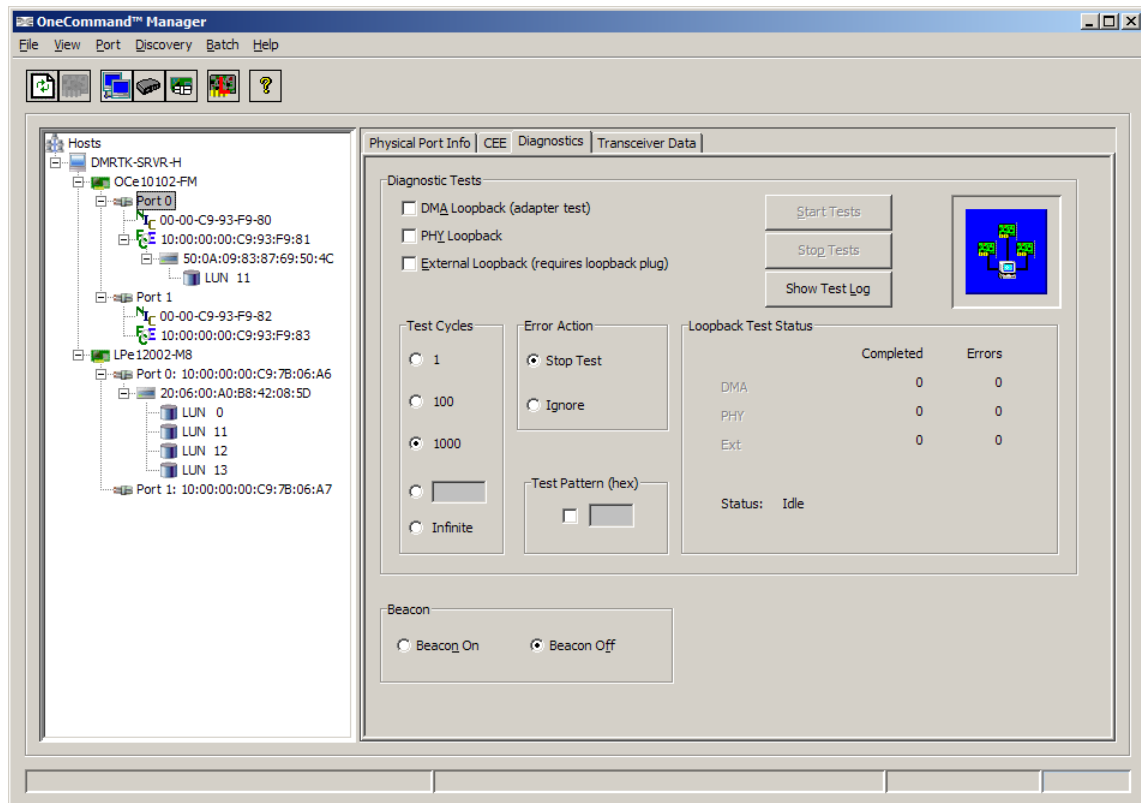
After the NIC teaming drivers have been installed, the NIC teams can be configured. The QLogic SANsurfer CLI allows only QLogic adapters to be teamed together. Although the process to create the team is relatively straightforward, the fact that you have to use the CLI makes the process more tedious than the competing products that use the graphical interface to configure teaming. If the QLogic NIC teaming were available in the graphical interface, a subsequent list of the completed configuration would not be needed, as it would have already been displayed.

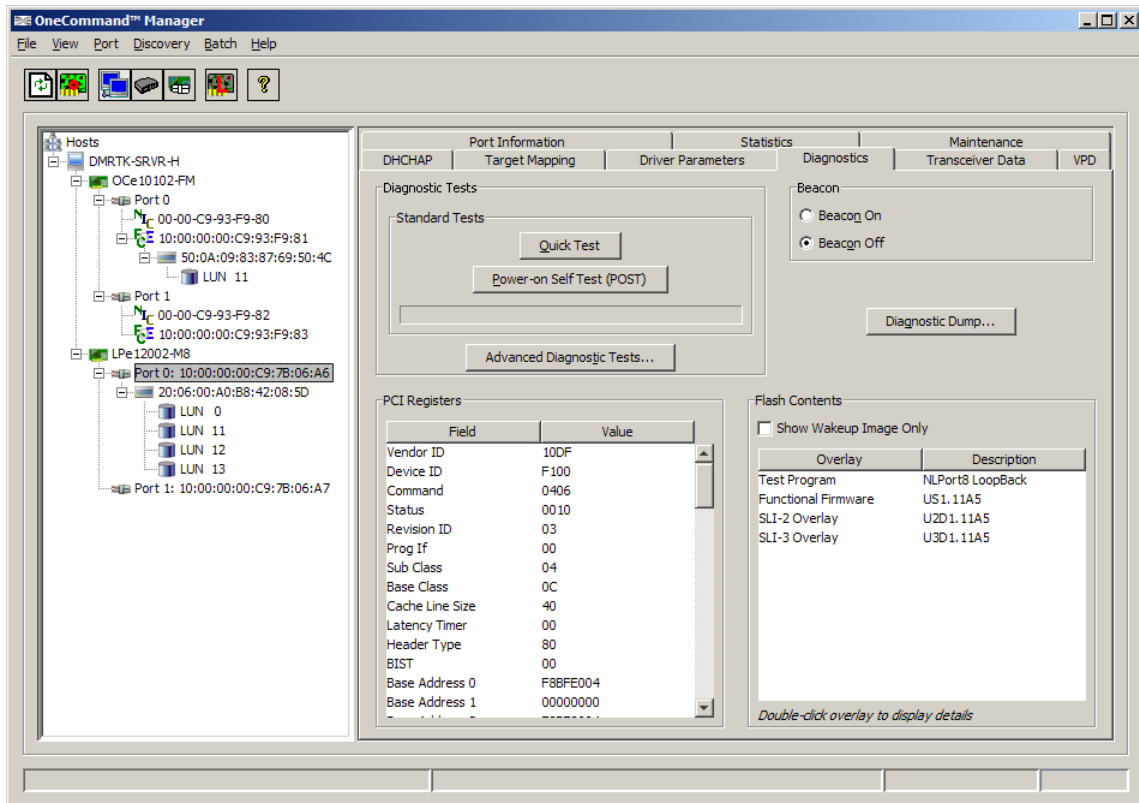
5 – Diagnostics

All three brands of management software provide diagnostic functions that allow an administrator to diagnose possible problems with the adapters.

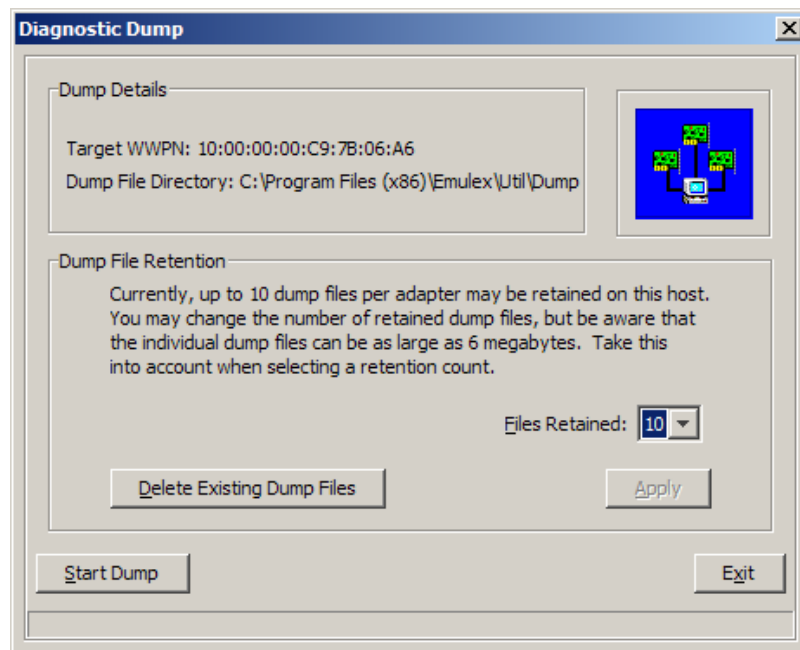
Emulex

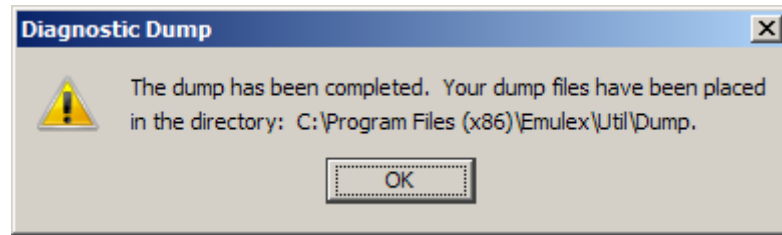
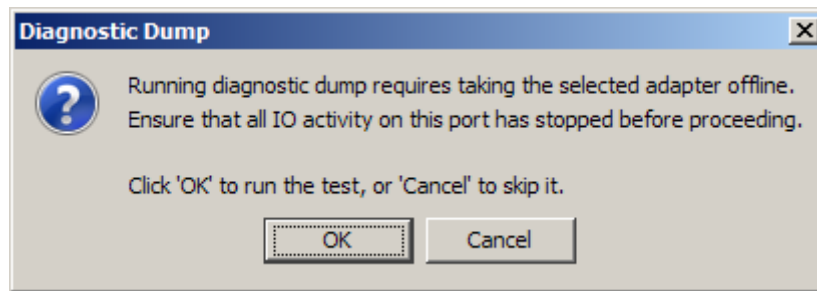
Emulex provides extensive diagnostic capabilities for its Fibre Channel HBAs and has provided these FC diagnostics for several years. Emulex provides basic diagnostics for its UCNAs.





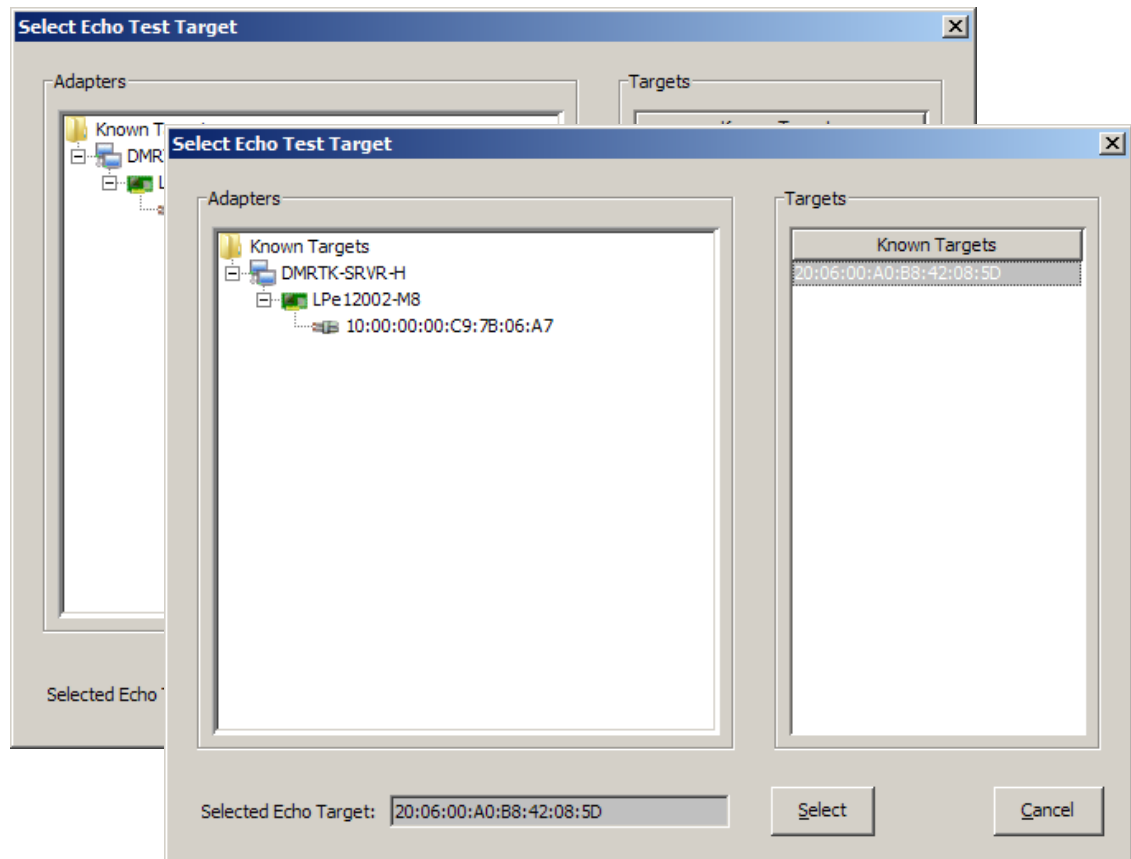
One of the unique and useful features of the Emulex OneCommand Manager application is the diagnostic dump feature for FC HBAs, which provides a detailed log of all the settings and state of the HBA. This log is provided in a location specified by the administrator.





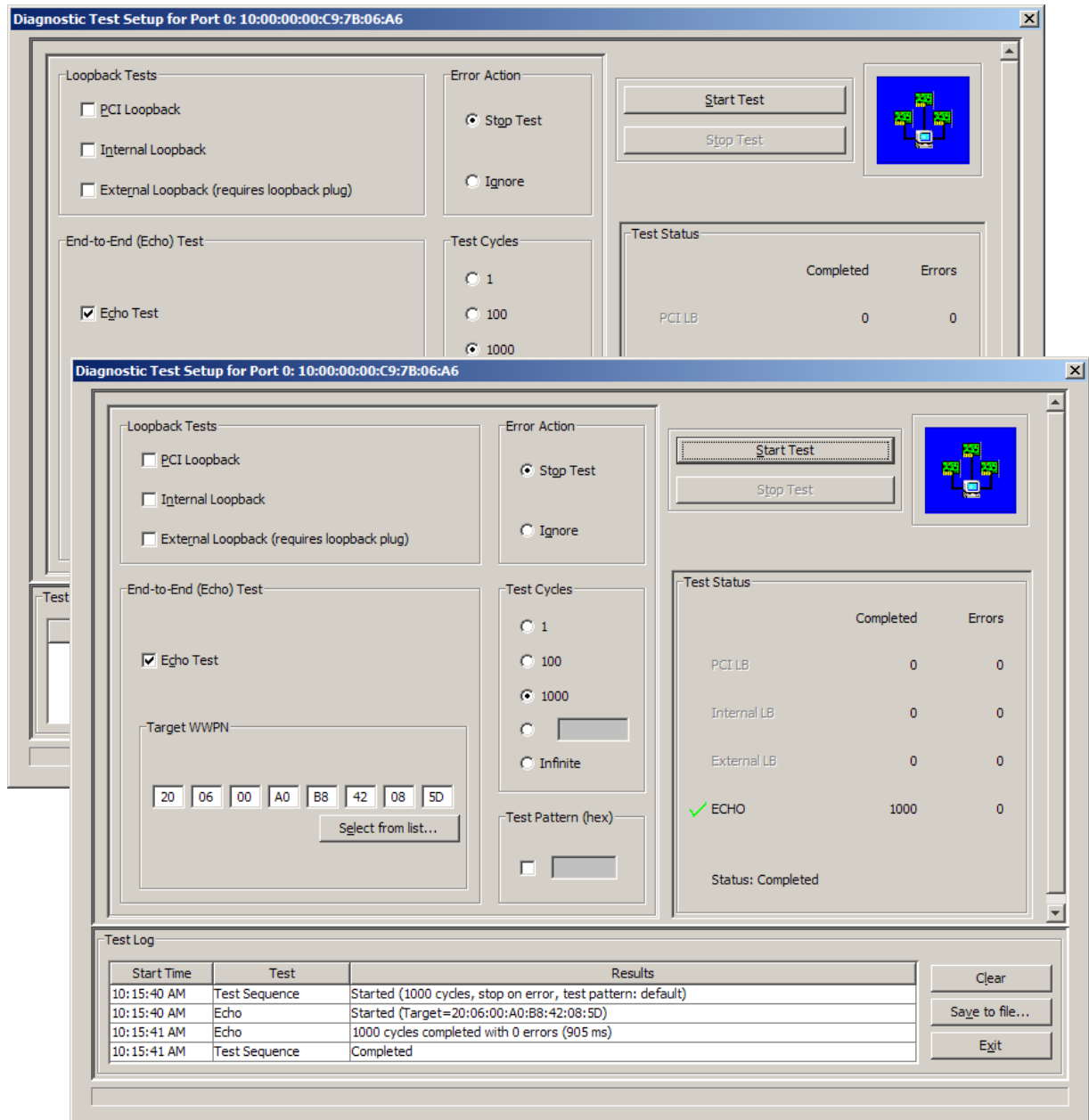
Emulex also provides a series of tests that can be run on the adapter that test local functions of the adapter, including various loopback tests and an echo test.

The echo test sends test packets to a target storage device that can be used to help diagnose problems with an end-to-end connection.



To perform the echo test, the desired storage target is selected from the list and then the echo test can be performed. The results of the echo test are displayed in the lower portion of the diagnostic screen. The log includes the number of times the echo test was run. In this example, the echo test was run 1000 times and completed in slightly less than one second (905 ms).

The results of these tests can be saved to a file for further examination, which is unique to the Emulex management software.



The screenshot displays the 'Diagnostic Test Setup for Port 0: 10:00:00:00:C9:7B:06:A6' window. It features several configuration panels:

- Loopback Tests:** Includes checkboxes for PCI Loopback, Internal Loopback, and External Loopback (requires loopback plug).
- End-to-End (Echo) Test:** The 'Echo Test' checkbox is checked.
- Target WWPN:** A field containing the hexadecimal value 20 06 00 A0 B8 42 08 5D, with a 'Select from list...' button below it.
- Error Action:** Radio buttons for 'Stop Test' (selected), 'Ignore', and 'Ignore'.
- Test Cycles:** Radio buttons for 1, 100, 1000 (selected), and Infinite.
- Test Pattern (hex):** A field with a 'Select from list...' button.
- Test Status:** A table showing the results of the tests.
- Test Log:** A table at the bottom recording the test sequence and results.

The Test Status table shows the following results:

	Completed	Errors
PCI LB	0	0
Internal LB	0	0
External LB	0	0
✓ ECHO	1000	0

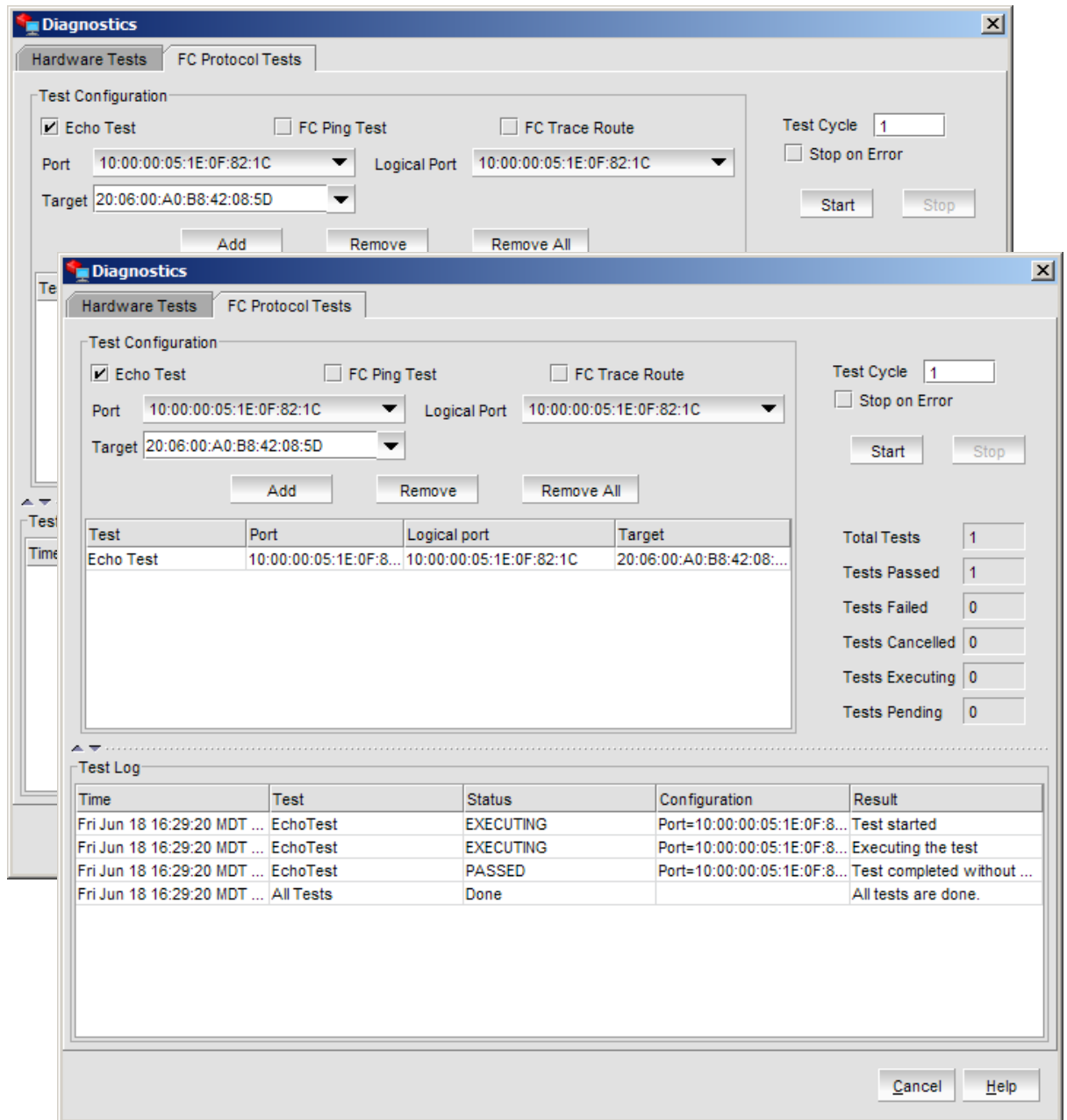
The Test Log table shows the following entries:

Start Time	Test	Results
10:15:40 AM	Test Sequence	Started (1000 cycles, stop on error, test pattern: default)
10:15:40 AM	Echo	Started (Target=20:06:00:A0:B8:42:08:5D)
10:15:41 AM	Echo	1000 cycles completed with 0 errors (905 ms)
10:15:41 AM	Test Sequence	Completed

Brocade

The Brocade HCM diagnostic tests are not as extensive as those available with the Emulex OneCommand Manager application. There is no diagnostic dump function, but there are the local and echo tests.

The echo test is available from the FC Protocol Tests tab. As with Emulex OneCommand Manager, the echo test requires a storage target and the results of the echo test are displayed in the lower portion of the diagnostic screen.



The screenshot shows two overlapping windows of the 'Diagnostics' application. The top window is in the 'FC Protocol Tests' tab, showing the 'Echo Test' configuration. The 'Echo Test' checkbox is checked, and the 'FC Ping Test' and 'FC Trace Route' checkboxes are unchecked. The 'Port' is set to 10:00:00:05:1E:0F:82:1C, the 'Logical Port' is also 10:00:00:05:1E:0F:82:1C, and the 'Target' is 20:06:00:A0:B8:42:08:5D. The 'Test Cycle' is set to 1, and the 'Stop on Error' checkbox is unchecked. 'Start' and 'Stop' buttons are visible.

The bottom window shows the same configuration but with a table of test results and a test log. The table below shows the configuration for the Echo Test.

Test	Port	Logical port	Target
Echo Test	10:00:00:05:1E:0F:8...	10:00:00:05:1E:0F:82:1C	20:06:00:A0:B8:42:08:...

Summary statistics on the right of the bottom window:

- Total Tests: 1
- Tests Passed: 1
- Tests Failed: 0
- Tests Cancelled: 0
- Tests Executing: 0
- Tests Pending: 0

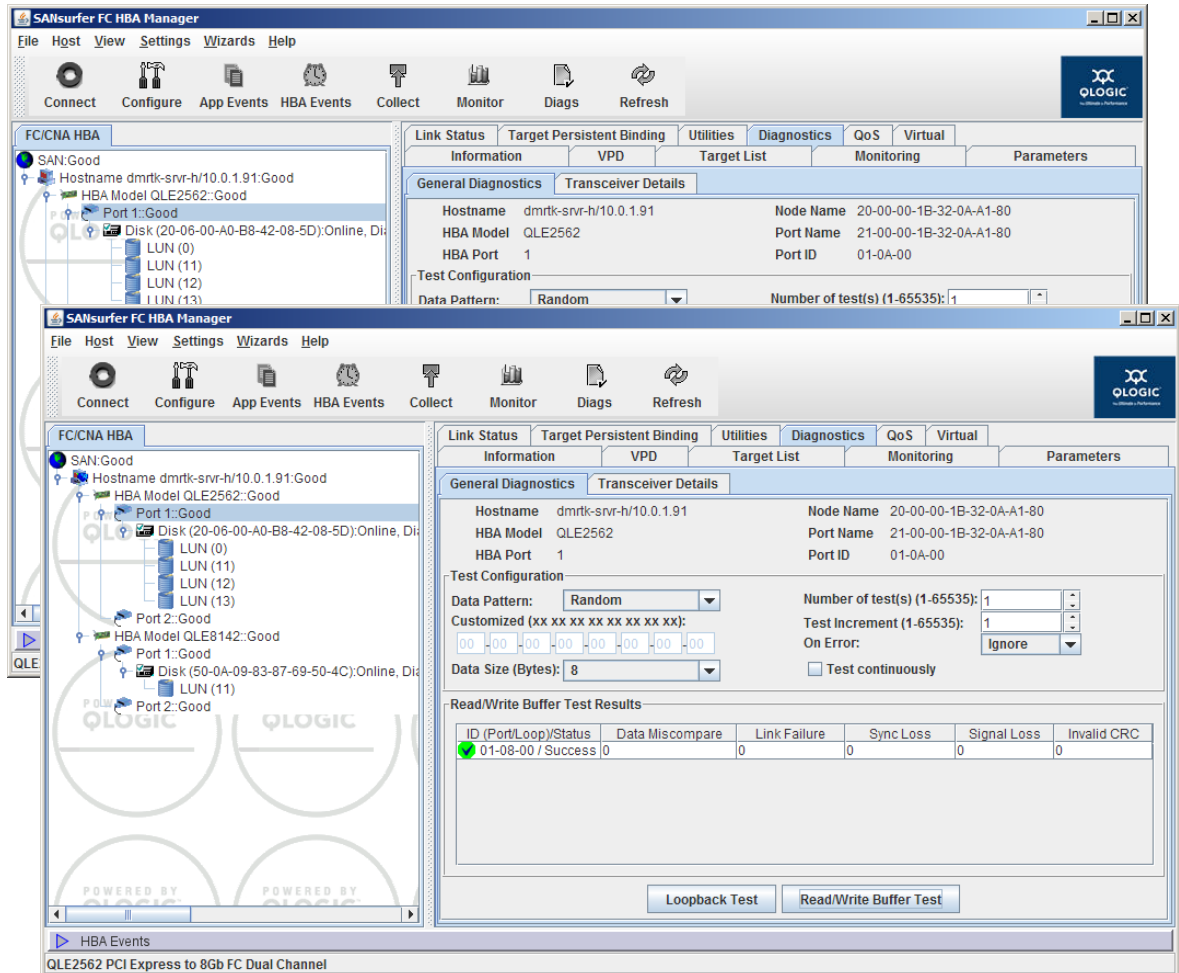
The 'Test Log' at the bottom shows the following entries:

Time	Test	Status	Configuration	Result
Fri Jun 18 16:29:20 MDT ...	EchoTest	EXECUTING	Port=10:00:00:05:1E:0F:8...	Test started
Fri Jun 18 16:29:20 MDT ...	EchoTest	EXECUTING	Port=10:00:00:05:1E:0F:8...	Executing the test
Fri Jun 18 16:29:20 MDT ...	EchoTest	PASSED	Port=10:00:00:05:1E:0F:8...	Test completed without ...
Fri Jun 18 16:29:20 MDT ...	All Tests	Done		All tests are done.

QLogic

QLogic SANsurfer provides several diagnostic tests including the echo test. In SANsurfer, the echo test is known as the “Read/Write Buffer Test”.

When the read/write buffer test is completed, a simple pass/fail is indicated in the lower portion of the main body of the diagnostics screen.



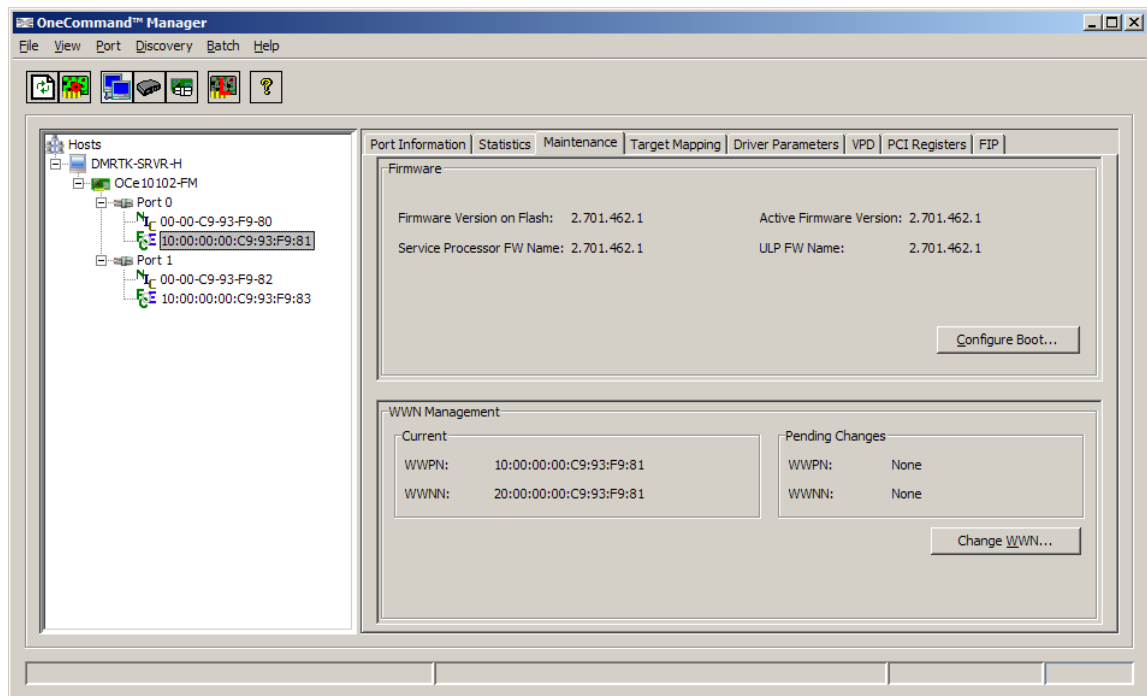
6 – Changing the World Wide Name (WWN)

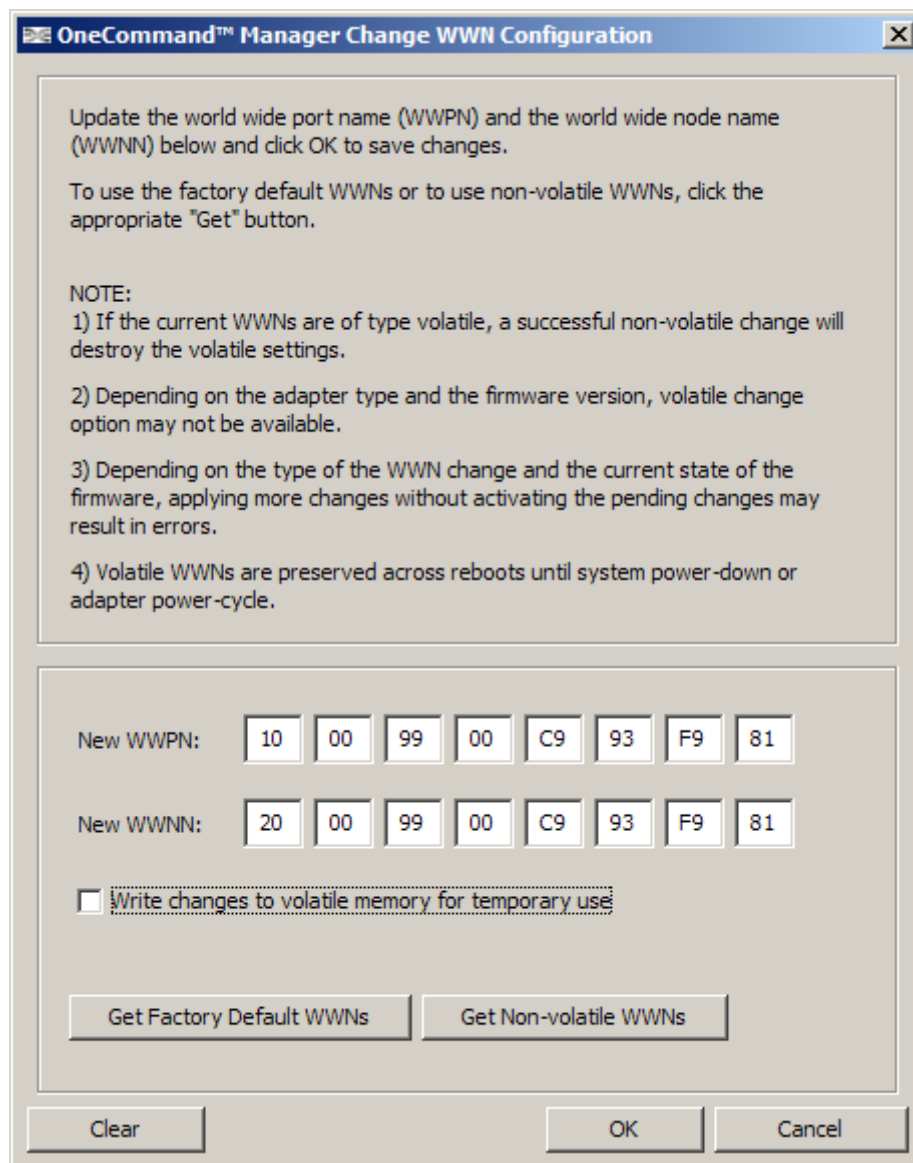
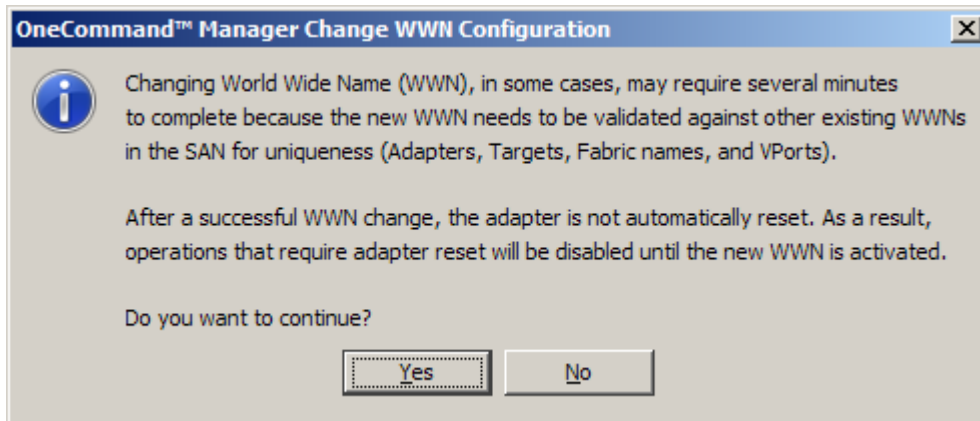
Fibre Channel SANs are often large and complex and SAN administrators typically prefer to make as few changes as possible to zoning, LUN masking and other related fabric management functions. Host adapters come from the factory with unique World Wide Names (WWN). When a host adapter fails and needs to be replaced, a change is typically required to the zoning and LUN masking to provide the WWN of the new adapter.

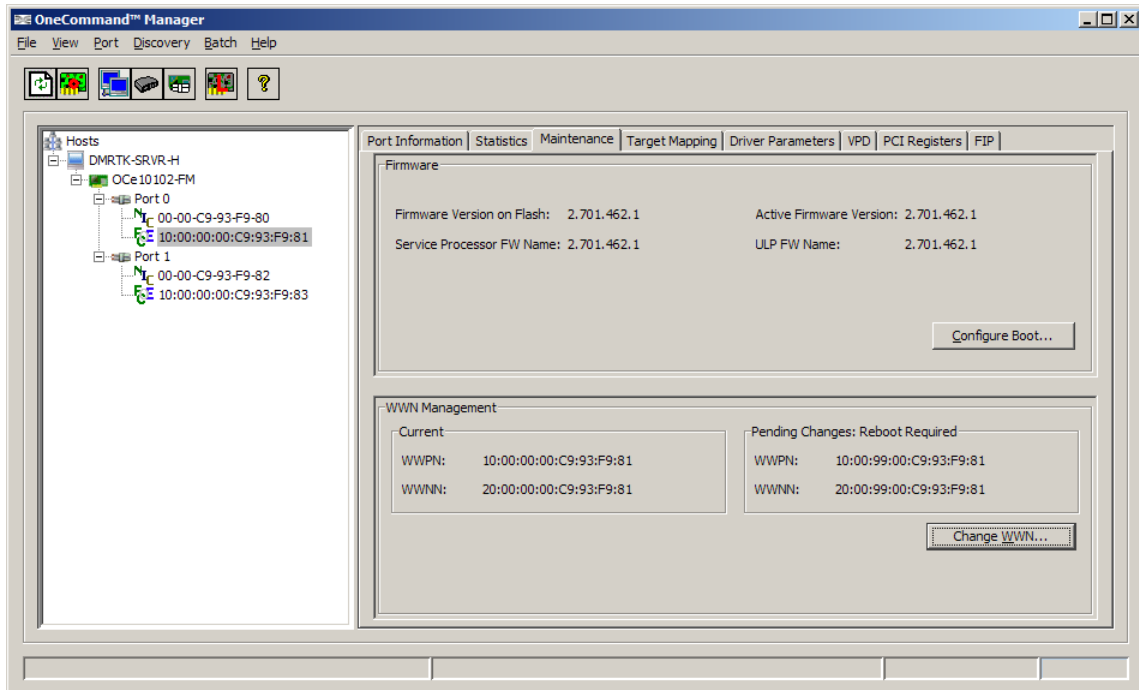
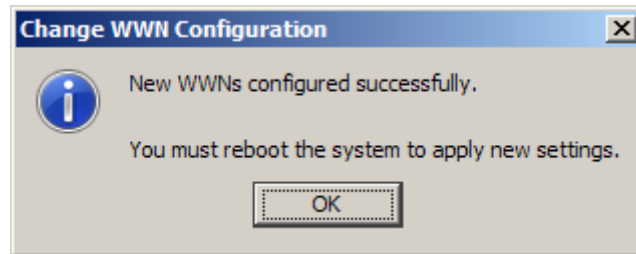
Emulex

Unique to Emulex is the WWN change feature, which allows an administrator to change the WWN (port name and node name) of a replacement adapter to match the WWN of the old adapter. This feature allows new adapters to be placed into service without having to change zoning and LUN masking of the existing Fibre Channel fabric. This feature works with Emulex FC HBAs and FCoE CNAs.

This change can be made permanent or made only to the volatile memory of the adapter for temporary testing. Emulex also provides a function to restore the factory default WWNs if needed.







7 – VMware Parameter Updates

In a VMware vSphere 4 environment, it may be necessary to manage the FCoE CNA installed in the VMware server from the adapter management software application installed in a different server. For this test, we attempted to manage the FCoE CNA installed in the VMware server from a separate server running Windows using the Windows version of the management software application.

We followed the documentation and installation instructions provided by each vendor and by VMware to install the adapter and appropriate drivers and software into the VMware server. We then attempted to manage the CNA installed in the VMware server (“dmrktk-srvr-c”) by discovering that server from a separate physical Windows server (“dmrktk-srvr-e”). We attempted to change several of the adapter parameters remotely and then confirm that these parameters were updated after a reboot of the VMware server. No guest machines were installed in the VMware server at the time of these tests.

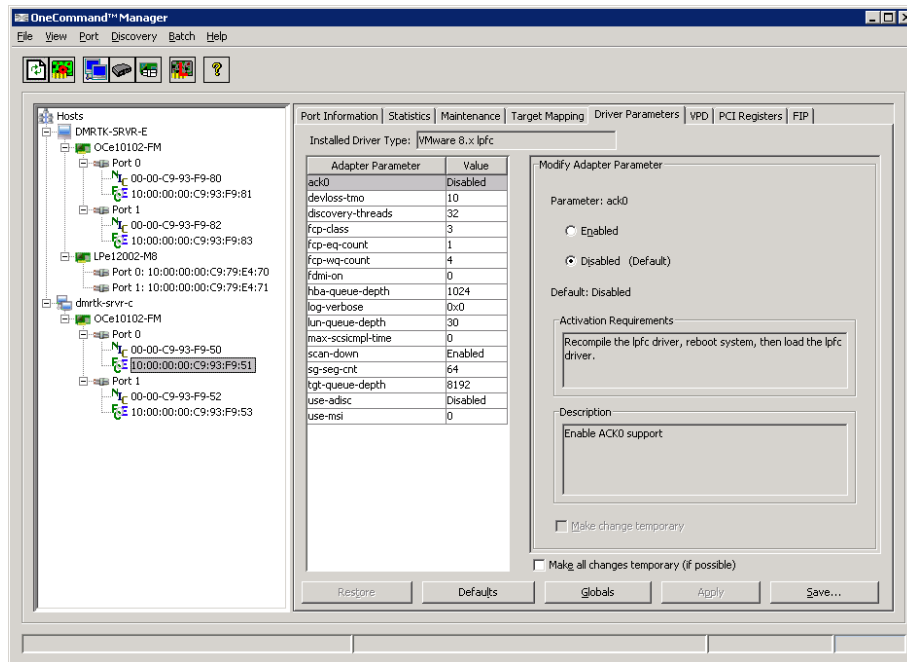
Emulex

We installed the Emulex FCoE CNA into the VMware vSphere 4 server and followed the instructions to install the FCoE and Ethernet drivers. Unlike the Windows version of the product that installs the FCoE and Ethernet drivers together in one installation, VMware requires that these two drivers be installed in separate steps. We downloaded the two Emulex driver packages from the VMware download site and installed them at the VMware vSphere 4 console using the “esxupdate” installation steps described in the documentation. The OneCommand Manager agent is also included with these drivers. After making the required adjustments to the VMware vSphere 4 firewall to allow communication with the Emulex drivers, we then proceeded to manage the CNA in the VMware server from a separate instance of Emulex OneCommand Manager running in a different physical server.

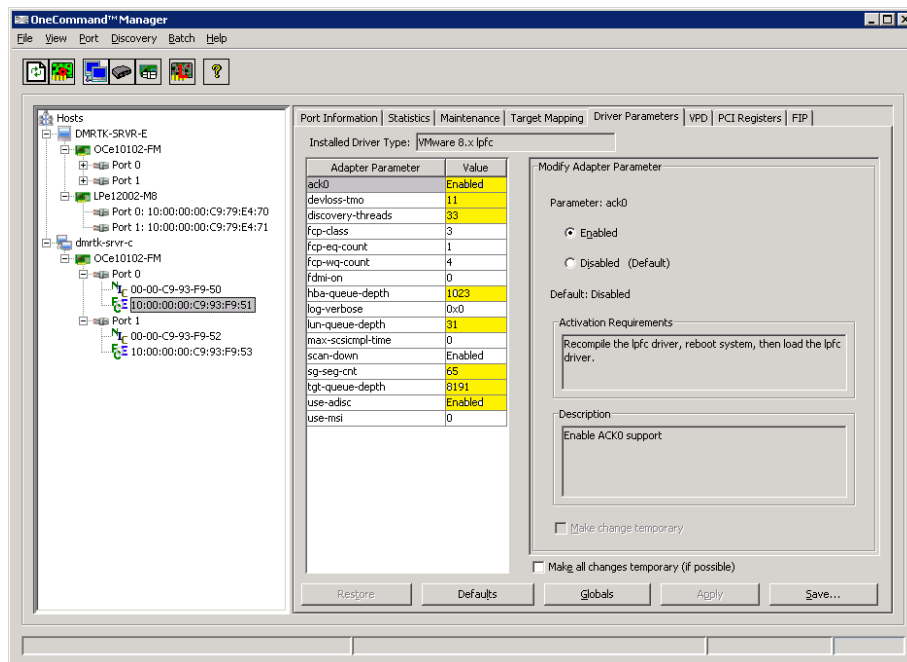
From the Windows server running Emulex OneCommand Manager, we were able to discover and communicate with the CNA installed in the VMware server by entering the VMware server name to OneCommand Manager’s discovery function. At this time, we were able to interrogate the CNA and change the adapter parameters, as show in the screen shots on the following pages.

Emulex OneCommand Manager provides a helpful description of the feature and the range of allowable values directly in the driver parameter screen, which is a benefit to administrators who might need a reminder for the many parameters that can be adjusted. Emulex OneCommand Manager also provides a way to restore the default values of all the driver parameters.

Emulex OneCommand Manager provides a batch mode distribution of adapter parameter settings by distributing a parameter file for the adapters to any or all of the servers with compatible Emulex adapters that are visible in the fabric. This file remains on the server and in the event of a change of adapter, the parameter settings remain, so that the adapter automatically uses them and the administrator does not have to individually reset the adapter parameter settings. This is especially useful in large environments where the detailed settings need to be consistent across a large number of servers and adapters.



Note that the CNA installed in the VMWare server (“dmrktk-srvr-c”) is visible to the Windows server (“dmrktk-srvr-e”), and that one of the FCoE ports is highlighted. We made changes to several of the driver parameters and rebooted the VMWare server. OneCommand Manager notified us that these changes required a reboot of the VMWare server. After the reboot, we were able to see that the parameters had been changed, which are highlighted in yellow.



QLogic

We installed the QLogic CNA into the VMware vSphere 4 server and followed the instructions to install the drivers and SANsurfer as described in the QLogic and VMware documentation.

Although we were able to install the FCoE and Ethernet drivers onto the VMware server, we were not able to get the SANsurfer component properly installed into the VMware vSphere 4 server. The available documentation from QLogic only provides instructions for ESX 3.5, and these instructions did not work on the vSphere 4.0 console. As a result, we were unable to manage the CNA in the VMware server from SANsurfer installed in the separate Windows Server.

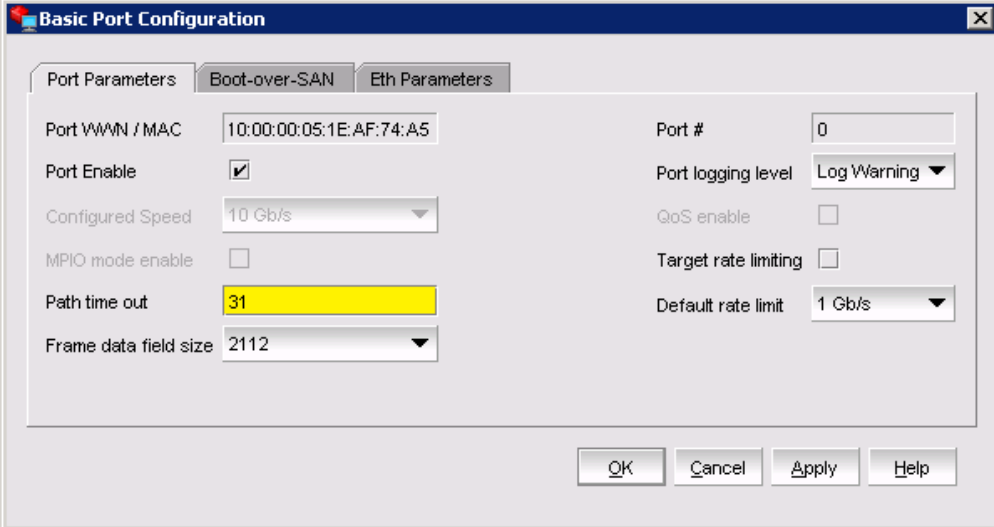
Brocade

We installed the Brocade CNA into the VMware vSphere 4 server and followed the instructions to install the drivers and the Brocade HCM agent mostly as described in the Brocade documentation. The Brocade documentation only includes instructions for VMware ESX 3.5, but not VMware vSphere 4. The instructions for installing the drivers as documented did not work for vSphere 4.0, but had to be modified slightly in order to work for vSphere 4.0.

We were able to manage the CNA installed in the VMware vSphere 4 server from a separate Windows Server running HCM. The HCM agent can be started as a service directly on the VMware vSphere 4 console. The full Brocade HCM does not run directly on the VMware vSphere 4 server console, but can be run from a guest operating system running on that VMware vSphere 4 server or elsewhere.

There is no direct equivalent to the “driver parameters” found in Emulex OneCommand Manager, but HCM has “port parameters” that can be changed. These port parameters are divided into two groups, the “basic” and “advanced”. Brocade HCM does not have as many editable port parameters as Emulex OneCommand Manager has driver parameters. We were able to edit these port parameters and verified that they remained as we set them after rebooting the VMware vSphere 4 server.

The port parameters, both basic and advanced, that can be edited are shown below. The values we changed are highlighted in yellow. Administrators can view the help screen separately to get an explanation of the port parameter details and default values.

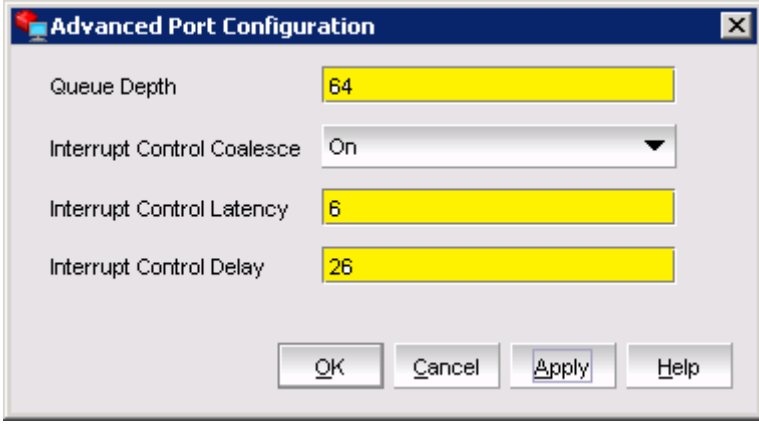


Basic Port Configuration

Port Parameters | **Boot-over-SAN** | Eth Parameters

Port WWN / MAC	10:00:00:05:1E:AF:74:A5	Port #	0
Port Enable	<input checked="" type="checkbox"/>	Port logging level	Log Warning ▼
Configured Speed	10 Gb/s ▼	QoS enable	<input type="checkbox"/>
MPIO mode enable	<input type="checkbox"/>	Target rate limiting	<input type="checkbox"/>
Path time out	31	Default rate limit	1 Gb/s ▼
Frame data field size	2112 ▼		

OK Cancel Apply Help



Advanced Port Configuration

Queue Depth	64
Interrupt Control Coalesce	On ▼
Interrupt Control Latency	6
Interrupt Control Delay	26

OK Cancel Apply Help

Summary and Conclusion

Although all three products provide a full set of management functions for their respective adapters, we found Emulex OneCommand Manager's interface to be easier to use, more intuitive, and automated the execution of various management functions. These capabilities help to streamline management and improve time to deployment, both critical factors in dynamic business environments. We liked the logging of firmware updates providing an "update" time-stamp for the individual adapters. We also found that OneCommand Manager's architecture can scale more effectively, helping to address the eventual growth of data center environments. In addition, many of OneCommand Manager's functions were designed to streamline installation and management functions by introducing a greater level of automation. This prevents IT administrators from having to manually repeat tasks.

	Emulex OneCommand Manager	Brocade HCM	QLogic SANsurfer
Combined driver and management software installation	Yes	Yes	No
Total number of steps to discover HBAs	1	1x number of hosts	6x number of HBAs
Host view of HBAs	Yes	Only one host at a time	Yes
Fabric view of HBAs	Yes	No	No
Firmware update without server reboot	Yes	N/A	No, for some functions
Batch mode selection of all HBAs for firmware update	Yes	No	No
Batch mode selection of all HBAs for driver parameter update	Yes	No	No
Description and value range of HBA driver parameters	Yes	Separately with "Help"	No
HBA driver/firmware diagnostic dump	Yes	No	No
NIC Teaming in the GUI	Yes	Yes	No
NIC Teaming for other brands of adapters	Yes	No	No
Change WWN	Yes	No	No
VMware parameter updates	Yes	Limited	?

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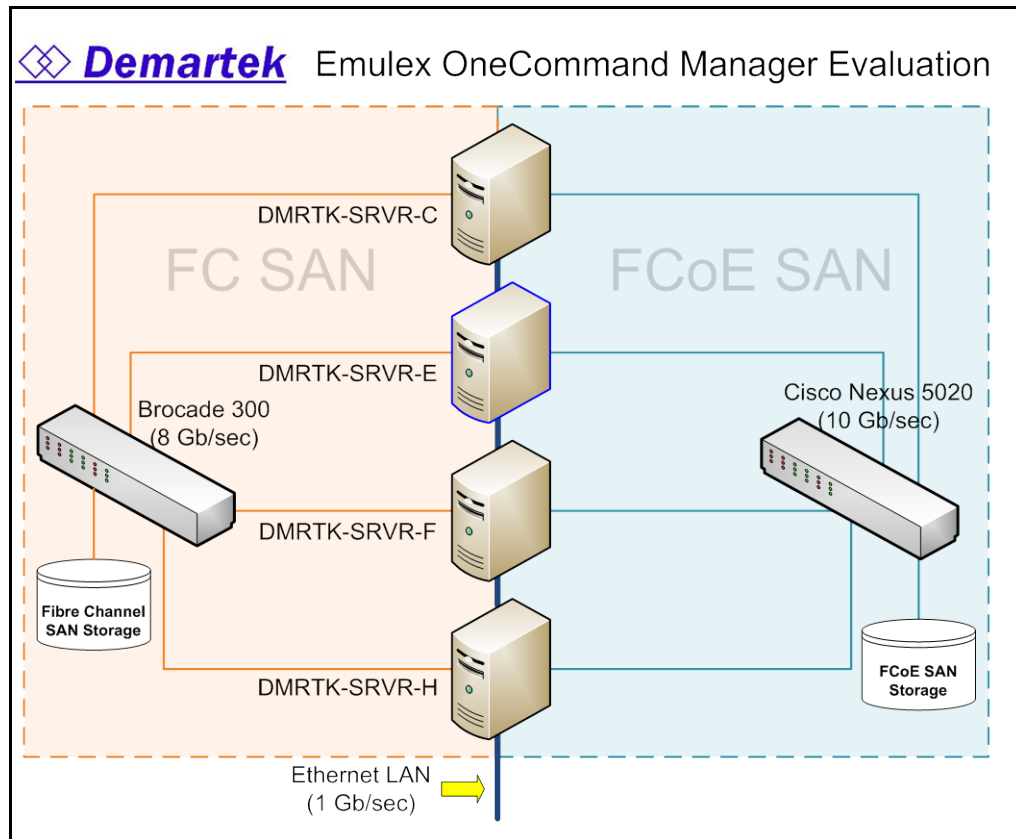
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Appendix – Evaluation Environment

This evaluation was conducted in the Demartek lab in Arvada, Colorado, USA using Demartek-owned servers and switching infrastructure. HBAs, CNAs and storage targets were added to this configuration as needed. When dual-port adapters were used, both ports were connected into the infrastructure.



Servers:

- DMRTK-SRVR-C: Dell PowerEdge 2900, Dual Intel Xeon E5345, 2.33 GHz, 8 total cores, 48GB RAM, VMware vSphere 4
- DMRTK-SRVR-E: Dell PowerEdge 2900, Dual Intel Xeon E5345, 2.33 GHz, 8 total cores, 16GB RAM, Windows Server 2008 R2 Enterprise
- DMRTK-SRVR-F: Dell PowerEdge 2900, Dual Intel Xeon E5345, 2.33 GHz, 8 total cores, 16GB RAM, Windows Server 2008 R2 Enterprise
- DMRTK-SRVR-H: SuperMicro X8DTH-6F, Dual Intel Xeon E5540, 2.53 GHz, 8 total cores, 16 logical processors, 48GB RAM, Windows Server 2008 R2 Enterprise

Switches:

- FC: Brocade 300, 8Gb/sec, 24 ports
- FCoE/Ethernet: Cisco Nexus 5020, 10Gb/sec, 40 ports

Storage targets:

- FC: IBM DS4700
- FCoE: NetApp FAS3040