EMULEX®

CIM Provider Package Version10.3

Installation Guide

Emulex Connects™ Servers, Storage and People

Table of Contents

List of Tables

1. Introduction

The Emulex® CIM Provider enables comprehensive management of Emulex host bus adapters (HBAs) and universal converged network adapters (UCNAs). It uses an industry standard application programming interface (API) Common Manageability Programming Interface (CMPI v2.0) to manage various Emulex adapters.

During installation, the Emulex CIM Provider registers with a Web-based Enterprise Management (WBEM) server running a CIM Object Manager (CIMOM) service. It then internally communicates with the Emulex management API/drivers and handles inquiries and requests from various CIM clients.

Emulex provides the following two CIM Providers:

- Emulex UCNA CIM Provider – supports the basic UCNA (FCoE, iSCSI, and NIC) profile. This provider supports the inventory and active management of UCNAs and also Link Up and Link Down events delivery using the Indication profile.
- Emulex FC HBA CIM Provider – supports the basic inventory and active management of FC adapters. This provider also supports Link Up and Link Down events delivery using the Indication profile.

Supported Platforms

Table 1-1 shows the platforms supported with the Emulex CIM Provider Kits.

Table 1-1 Emulex CIM Provider Supported Platforms

Operating Systems	Emulex CIM Provider Kits
VMware ESXi 5.5	vmware-esx-provider-emulex-cim-provider-5.5.0-<kit version>.zip
VMware ESXi 5.0 and ESXi 5.1	vmware-esx-provider-emulex-cim-provider-50.<kit version>.zip/vib
SLES11	emulex_fc_provider-<kit version>-sles11.i586.rpm emulex_ucna_provider-<kit version>-sles11.i586.rpm emulex_fc_provider-<kit version>-sles11.x86_64.rpm emulex_ucna_provider-<kit version>-sles11.x86_64.rpm
RHEL 7	emulex_fc_provider_i-<kit version>-rhel7.0.x86_64.rpm emulex_ucna_provider-<kit version>-rhel7.0.x86_64.rpm
RHEL 6 64-bit KVM	emulex_fc_provider_pegasus-<kit version>-rhel6.x86_64.rpm emulex_ucna_provider_pegasus-<kit version>-rhel6.x86_64.rpm **Note:** Pegasus rpms are released for RHEL6 64-bit KVM.
RHEL 6	emulex_fc_provider_<kit version>-rhel6.i686.rpm emulex_ucna_provider_<kit version>-rhel6.i686.rpm emulex_fc_provider_ibm-<kit version>-rhel6.x86_64.rpm emulex_ucna_provider_ibm-<kit version>-rhel6.x86_64.rpm

Table 1-1 Emulex CIM Provider Supported Platforms (Continued)

Operating Systems	Emulex CIM Provider Kits
RHEL 5	emulex_ucna_provider-<kit version>-rhel5.i386.rpm
	emulex_fc_provider-<kit version>-rhel5.i386.rpm
	emulex_ucna_provider-<kit version>-rhel5.x86_64.rpm
	emulex_fc_provider-<kit version>-rhel5.x86_64.rpm
Windows IBM Director compatible	emulex_fc_provider.msi
	emulex_fc_provider_x64.msi
	emulex_ucna_provider.msi
	emulex_ucna_provider_x64.msi

Supported CIM Provider Profiles

Profiles supported for both Emulex UCNAs and FC HBAs

- Profile Registration – DMTF DSP1033
- Software Inventory – DMTF DSP1023
- Host Discovered Resources – SNIA SMI-S 1.5 Part 6 Clause 7
- FCoE Initiator Ports – SNIA SMI-S 1.5 Part 2 Clause 22
- Software Update – DMTF DSP1025
- Record Log – DMTF DSP1010
- Access Points – SNIA SMI-S 1.5 Part 2 Clause 23
- Physical Package – SNIA SMI-S 1.5 Part 2 Clause 31
- PCI Device – DMTF DSP1075
- Physical Assets Profile – DMTF DSP1011
- Storage HBA – SNIA SMI-S 1.5 Part 6 Clause 6
- Indication Profile (partial) – DMTF DSP1054

Profiles supported for Emulex UCNAs only

- Ethernet Port – DMTF DSP1014
- Host LAN Network Port – DMTF DSP1035
- IP Interface – DMTF DSP1036
- Diagnostics (CDMv2) – DMTF DSP1002
- iSCSI Initiator – SNIA SMI-S 1.5 Part 6 Clause 9
- iSCSI Initiator Ports Profile – SNIA SMI-S 1.5 Part 2 Clause 16

Profiles supported for Emulex FC HBAs only

- FC HBA – SNIA SMI-S 1.5 Part 6 Clause 5
- FC Initiator Ports Profile – SNIA SMI-S 1.5 Part 2 Clause 17
- FC HBA Diagnostic profile – DMTF DSP1104

2. Installing the Emulex CIM Provider

Prerequisites

- An Emulex OneConnect UCNA or LightPulse CFA in FCoE+NIC mode
- An FC HBA or CFA in FC mode
- The appropriate adapter drivers
- The corresponding Emulex OneCommand Manager Core Kit

Note: If you do not know the driver version and corresponding OneCommand Manager Core Kit that must be installed on your system, contact an authorized Emulex technical support representative.

In VMware

Use the standard esxcli commands to install the vib/offline-bundle.

For example, type the following command:

```
esxcli software vib install -d <offline-bundle.zip> --maintenance-mode
```

If you are using a zipped file and have already unzipped it, type the following command (on one line):

```
esxcli software vib install
--viburl=<file:/vmware-esx-provider-emulex.vib>  --maintenance-mode
```

Manually Installing the Emulex CIM Provider with an IBM Platform Agent

In Linux

To manually install the Emulex CIM Provider:

1. Extract the Emulex CIM Provider RPM.
2. Place the libraries/binaries in the directory as required by the Open Pegasus CIMOM.

   This path is configurable and depends on the customization performed in the CIMOM.

   For example:

   - In tog-pegasus CIMOM, the path is /usr/lib/Pegasus/providers/.
   - In the development build of Open Pegasus, the path is $PEGASUS_HOME/bin.

   Refer to the CIMOM release notes for the exact path.

   In Linux, the extracted libraries/binaries are

```
libelxhba_cmpi_provider.so/libemulex_ucna_provider.so.
```
3. Ensure that there is no "ldd" dependency for the extracted libraries/binaries.
4. Compile the extracted mof files. Ensure that the $PEGASUS_HOME variable is set in the shell and the "$PEGASUS_HOME/bin" is included in the system path ($PATH) variable. Execute the following commands from the same shell:

```
cimmofl -aEV -n root/emulex elxhba_schema.mof
```

This command compiles the Emulex CIM Provider schema file:

```
cimmofl -aEV -n root/pg_interop elxhba_interop_schema.mof
```

This command compiles the Emulex CIM Provider schema file for SLP registration:

```
cimmofl -aEV -n root/pg_interop elxhba_reg.mof
```

This command compiles the Emulex CIM Provider registration file.

5. Restart the CIMOM.
6. Check the installation using the following command:

```
cimprovider -ls
```

The status of "elxhba_cmpi_provider_Module/emulex_ucna_provider_Module" must be **OK**.

Generating Provider Logs

To enable provider logs:

1. Enumerate the ELXHBA_RecordLog (for an FC HBA) or the ELXUCNA_RecordLog (for a UCNA) class and note the provider log instance. If enumeration fails, perform the steps detailed in "Generating Provider Logs When Enumeration Fails" on page 8.
2. Set the provider log settings:

```
wbemcli -noverify cm 'https://root:<password>@<IP>/root/emulex:<Instance
from step 1> ' SetLogParams.LogLevel=5,logmode=2,tracepath='<file path>'
```

3. Set the provider log state:

```
wbemcli -noverify cm 'https://root:<password>@<IP>/root/emulex:<Instance
from step 1> ' RequestStateChange.RequestedState=2
```

4. Perform the operation that is not working as expected. The provider logs are available in the <file path> specified in step 2.
5. Contact an Emulex technical support representative with the provider logs and the system logs (/var/log/messages for Linux or /var/log/syslog.log for ESXi).

To disable provider logs, enter the following command:

```
wbemcli -noverify cm 'https://root:<password>@<IP>/root/emulex:<Instance
from step 1> ' RequestStateChange.RequestedState=3
```

Generating Provider Logs When Enumeration Fails

To enable provider logs when enumeration fails:

1. Stop the CIMOM.

2. Create a file "emulex_fc_provider.dmp (for FC HBA)" or "emulex_ucna_provider.dmp (for UCNA)" in "/etc" location, and manually enter the following two lines (without spaces):

   ```
   2,5,2
   /tmp/providerlogs.txt
   ```

3. Start the CIMOM and enumerate the Emulex classes in the "root/emulex" namespace.

4. Perform the operation which is not working as expected. The provider logs are available in </tmp/providerlogs.txt> specified in step 2.

5. Contact an Emulex technical support representative with the provider logs and the system logs (/var/log/messages for Linux or /var/log/syslog.log for ESXi).

Additional Information

To repair a faulty CIM Provider installation, contact an Emulex technical support representative with the following additional information:

In ESXi 5.0 and 5.1

Output from the following commands:

```
esxcfg-scsidevs -a
esxcli software vib list | grep -i be2
esxcli software vib list | grep -i lpfc
esxcli software vib list | grep -i emu
esxcli software vib list | grep -i elxnet
```

In ESXi 5.5

Output from the following commands:

```
esxcfg-scsidevs -a
esxcli software vib list | grep -i elx
esxcli software vib list | grep -i lpfc
esxcli software vib list | grep -i emu
esxcli software vib list | grep -i elxnet
```

In Linux

1. Output of any one of the following commands:

   ```
   /usr/sbin/hbanyware/hbacmd listhbas
   ```

   Or

   ```
   /usr/sbin/ocmanager/hbacmd listhbas
   ```

2. Restart the CIMOM and then enumerate the ELXUCNA_SoftwareIdentity and ELXHBA_SoftwareIdentity classes in the "root/emulex" namespace.

   For example:

   ```
   wbemcli -nl -noverify ein 'https://root:<password>@<IP
   address>/root/emulex:ELXHBA_SoftwareIdentity'
   ```

3. Provide the system logs /var/log/messages for Linux or /var/log/syslog.log for ESXi for the operation performed in step 2.

4. Output from the following commands:

```
rpm -qa| grep -i elx
rpm -qa| grep -i lpfc
rpm -qa| grep -i be2
lspci
```

3. Using the Adapter

This section describes updating firmware, enabling logs, using diagnostics, and discovering vNICs.

If you require additional information, contact an authorized Emulex technical support representative at tech.support@emulex.com, 800-854-7112 (US/Canada toll free), +1714-885-3402 (US/International), or +44 1189-772929 (Europe, Middle East, and Africa).

Updating the Firmware on an Emulex Adapter

The Software Update profile is supported on both the Emulex UCNA CIM Provider and the Emulex FC HBA CIM Provider. You must use this profile to update the firmware on the Emulex adapters. The following methods are implemented in the Emulex-specific Software Update profile:

- InstallfromByteStream – requires a custom CIM client, which can read the firmware file and create a ByteStream that is used for updating the firmware.
- InstallfromURI – supports two different types of URI (Uniform Resource Identifiers).
  - The firmware file to be upgraded is available locally on the machine hosting the Emulex adapter.
  - The firmware file to be upgraded is available on a remote machine like an http or an https server. In this case, the Emulex UCNA CIM Provider uses the "libcurl" library available on the host machine, where the CIM Provider is running, to download the firmware file.

The Emulex CIM_SoftwareInstallationServiceCapabilities class has the attribute SupportedURISchemes that indicates the supported URI schemes.

To update the firmware:

1. Enumerate the CIM_SoftwareInstallationService in Emulex's namespace. Select the CIM_SoftwareInstallationService specific to the adapter on which the firmware is to be updated.

    For example: If the UCNA needs a firmware update, select the ELXUCNA_SoftwareInstallationService class instance.

    ```
    wbemcli  -noverify ein
    'https://root:<password>@<IP>/root/emulex:elxucna_softwareinstallations
    ervice' -nl
    ```

2. Enumerate the CIM_FCPort or CIM_EthernetPort depending on the adapter on which the firmware is to be updated. Select the desired port from the enumerated instances.

    For example:

    ```
    wbemcli  -noverify ein
    'https://root:<password>@<IP>/root/emulex:elxucna_ethernetport' -nl
    ```

3. Select the correct firmware file and choose one of the two methods detailed in steps 1 and 2 to update the firmware.

For example:

```
wbemcli -nl -noverify cm
'https://root:<password>@<IP>/root/emulex:<elxucna_softwareinstallation
service instance>' InstallFromURI.URI="<Firmware file
path>",Target=<elxucna_ethernetport instance>
```

Enabling Logs and Collecting Symptoms

The Record Log profile is supported on both the Emulex UCNA CIM Provider and the Emulex FC HBA CIM Provider.

To enable logs:

1. Enumerate the specific instance of the CIM_RecordLog class. For example, if the traces need to be enabled for an UCNA CIM Provider, enumerate the ELXUCNA_RecordLog instance.
2. Invoke the method SetLogParams with "loglevel=5", "logmode=2", and "tracepath=tracefile path".
3. Invoke the method RequestStateChange with "RequestedState=2".

    Traces are collected in the file specified in the "tracepath" attribute in step 2.

Important checkpoints or critical errors are also logged in the /var/log/message file for Linux and the var/log/syslog.log file for ESXi.

Uninstalling a Corrupted or Invalid OneCommand Manager Core Kit

Use the "-nodeps" option to uninstall an existing corrupted or invalid version of the OneCommand Manager Core Kit.

Extracting Windows Binaries in MSI Packages?

For MSI packages, use the "msiexec" command to extract the files without installing the package.

To extract Windows binaries:

1. Click **Start > Run** and open the command prompt.
2. Run the following command:

    ```
    msiexec /a <msi file>
    ```
3. Specify the path where the files must be extracted. Follow the wizard to complete the process.

    The files are available in the specified file location.

    For *.exe packages, use the following command:

    ```
    <*.exe> /install:<local path>
    ```

For example: The command "c:\>emulex_fc_provider_pegasus_x64-2.x.x0.1.exe
/install:C:\temp" extracts all the files from
"emulex_fc_provider_pegasus_x64-2.x.x0.1.exe" to "c:\temp" directory.

Executing a Diagnostic Test

Executing a Diagnostic Test for an Emulex UCNA Adapter

To execute a diagnostic test with the Emulex CIM Provider:

1. Get the instance of the managed element (ethernetport). For example:

```
wbemcli  -noverify ein
'https://root:<password>@<IP>/root/emulex:elxucna_ethernetport' -nl
```

2. Get the instance of the ELXUCNA_DiagnosticTest class. For example:

```
wbemcli  -noverify ein
'https://root:<password>@<IP>/root/emulex:elxucna_diagnostictest' -nl
```

3. Invoke the method RunDiagnosticservice on the elxucna_diagnostictest. For
example:

```
wbemcli -noverify cm
'https://root:<password>@<IP>/root/emulex:<Diagnostic Test instance from
step 2>' RunDiagnosticservice.ManagedElement=<ManagedElement instance
from step 1>'
```

4. A CIM_ConcreteJob instance is created for each diagnostic test run. For example:

```
wbemcli  -noverify ein
'https://root:<password>@<IP>/root/emulex:elxucna_concretejob' -nl
```

5. Results of the diagnostic test runs are available in the attributes RecordData and
JobState in ELXUCNA_DiagnosticCompletionRecord class instances. For example:

```
wbemcli  -noverify ei
'https://root:<password>@<IP>/root/emulex:elxucna_diagnosticcompletionr
ecord' -nl
```

6. The diagnostic logs can be cleared using the ClearLog function of
ELXUCNA_DiagnosticsLog class. For example:

```
wbemcli -noverify cm
'https://root:<password>@<IP>/root/emulex:<Corresponding Diagnostic log
instance>' ClearLog
```

Executing a Diagnostic Test for an Emulex FC Adapter

To execute a diagnostic test with an FC adapter:

1. Get the instance of the managed element (ELXHBA_PortController). For example:

```
wbemcli  -noverify ein
'https://root:<password>@<IP>/root/emulex:elxhba_portcontroller' -nl
```

2. Get the instance of the ELXHBA_FCHBADiagnostictest class. For example:

```
wbemcli  -noverify ein
'https://root:<password>@<IP>/root/emulex:elxhba_diagnostictest' -nl
```

3. Invoke the method RunDiagnosticservice on the ELXHBA_FCHBADiagnostictest.
For example:

```
wbemcli -noverify cm
'https://root:<password>@<IP>/root/emulex:<Diagnostic Test instance from
step 2>' RunDiagnosticservice.ManagedElement=<ManagedElement instance
from step 1>'
```

4. A CIM_ConcreteJob instance is created for each diagnostic test run. For example:

```
wbemcli  -noverify ein
'https://root:<password>@<IP>/root/emulex:elxhba_concretejob' -nl
```

5. Results of the diagnostic test runs are available in the attributes RecordData and JobState in ELXHBA_DiagnosticCompletionRecord class instances. For example:

```
wbemcli  -noverify ei
'https://root:<password>@<IP>/root/emulex:elxhba_diagnosticcompletionre
cord' -nl
```

6. The diagnostic logs can be cleared using the ClearLog function of ELXHBA_DiagnosticsLog class. For example:

```
wbemcli -noverify cm
'https://root:<password>@<IP>/root/emulex:<Corresponding Diagnostic log
instance>' ClearLog
```

Discovering vNICs Using the Emulex CIM Provider

To Determine vNICs Using the UCNA CIM Provider:

1. Find all the CIM_VLANEndpoint instances whose SystemName property has a value equal to the name of the desired host. These instances are vNIC endpoints.

2. Find the CIM_EndpointIdentity instance associating the CIM_VLANEndpoint instance to a CIM_LANEndpoint instance. Follow the association to the CIM_LANEndpoint.

3. Find the instance of CIM_DeviceSAPImplementation instance that associates the CIM_LANEndpoint to an instance of CIM_EthernetPort. Follow the associations to the CIM_EthernetPort instance representing the vNIC.

To Determine vNICs Hosted by a UCNA in a Particular Host

1. Find the CIM_Card instance for the UCNA.

2. Find the vNICs in the host as detailed earlier, based on the version of the CIM Provider.

3. For each CIM_EthernetPort representing a vNIC:

   a. Find the instance of CIM_ControlledBy associating the CIM_EthernetPort to an instance of CIM_PortController. Follow the association to the CIM_PortController instance.

   b. Find the instance of CIM_Realizes associating the CIM_PortController to an instance of CIM_PhysicalConnector. Follow the association to the CIM_PhysicalConnector instance.

   c. Find the instance of CIM_Container associating the CIM_PhysicalConnector to an instance of CIM_Card.

Each CIM_EthernetPort with a CIM_Container instance referencing the CIM_Card instance found in step 1 is hosted by the targeted UCNA.

To determine vNICs operating over the same physical port:

1. Find the CIM_PhysicalConnector instance representing the port in question. The key value for CIM_PhysicalConnector instances contains the serial number of the UCNA hosting the port and the port number assigned to the physical port.

2. Find the vNICs in the host as detailed earlier, based on the version of the CIM Provider. For each CIM_EthernetPort representing a vNIC:

    a. Find the instance of CIM_ControlledBy associating the CIM_EthernetPort to an instance of CIM_PortController. Follow the association to the CIM_PortController instance.

    b. Find the instance of CIM_Realizes associating the CIM_PortController to an instance of CIM_PhysicalConnector.

    Each CIM_EthernetPort with a CIM_Realizes instance referencing the CIM_PhysicalConnector instance found in step 1 is running over the targeted physical port.