CIM Provider Package Version 10.4

Installation Guide

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Note: References to OCe11100 series products also apply to OCe11100R series products.

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1. Introduction

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

Emulex provides two CIM Providers:

- Emulex FC HBA CIM Provider – supports the basic inventory and active management of Fibre Channel (FC) adapters.
- Emulex CNA CIM Provider – supports the basic CNA (FCoE, iSCSI, and NIC) profile.

Note: The CIM Provider supports the Emulex OCe14000-series adapters and the LPe16202 CNA. If the CNA is in FC mode, it functions as an FC adapter. If it is in FCoE+NIC mode, the adapter functions as a CNA.

During installation, the Emulex CIM Provider registers with a Web-based Enterprise Management (WBEM) server running a CIM Object Manager (CIMOM) service. The CIM Provider performs the following functions:

- Internally communicates with the Emulex management API
- Internally communicates with the Emulex drivers
- Handles inquiries and requests from various CIM clients.

Supported Platforms

Table 1-1 on page 5 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 5.1	vmware-esx-provider-emulex-cim-provider-51.<kit version>.zip
VMware ESXi 6.0	vmware-esx-provider-emulex-cim-provider-60.<kit version>.zip

Supported CIM Provider Profiles

These supported CIM Provider Profiles are grouped by CNAs and FC HBAs, CNAs only and FC HBAs only.

Emulex CNAs and FC HBAs

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

Emulex CNAs Only

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

Emulex FC HBAs Only

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

Abbreviations

API	Application Programming Interface
CIM	Common Interface Model
CIMOM	CIM Object Manager
CMPI	Common Manageability Programming Interface
CNA	converged network adapter
FC	Fibre Channel
FCoE	Fibre Channel over Ethernet
HBA	host bus adapter
iSCSI	internet Small Computer System Interface
KVM	kernel-based virtual machine
LAN	local area network
NIC	network interface card (or controller)
SFCB	Small Footprint CIM Broker
URI	Uniform Resource Identifiers
VIB	vSphere Installation Bundle
vNIC	virtual network interface card
WBEM	Web-based Enterprise Management

2. Installing the Emulex CIM Provider

The following must be installed before you can install the Emulex CIM Provider.

- One of the following adapters:
  - An Emulex OneConnect® or LightPulse® CNA
  - An FC HBA or CNA in FC mode
- The appropriate adapter drivers

Note: HBAs and CNAs on an esxi host running Emulex CIM providers can be managed by a Windows server using the following applications (installed on Windows operating systems):

- The Emulex OneCommand® Manager application for Windows
- The OneCommand Manager for VMware vCenter

See the VMware download page on the Emulex website or the vendor to verify the driver version or the OneCommand Manager application version that must be installed on your system.

VMware

Use one of the standard esxcli commands to install the VIB or the offline bundle.

Installing the VIB

- To install the VIB, type

  ```
  esxcli software vib install -v <provider.vib> --maintenance-mode
  ```

- To install the signed offline bundle, type

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

- To install an unzipped file, type

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

3. Using Adapters

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

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

Updating Firmware on Emulex Adapters

The Software Update profile is supported on both the Emulex CNA 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, that can read the firmware file and create a ByteStream that is used for updating the firmware.
- InstallfromURI – supports two different types of URI:
  - The firmware file to be updated is available locally on the machine hosting the Emulex adapter.
  - The firmware file to be updated is available on a remote machine such as a http or https server. In this case the Emulex CNA 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 CNA needs a firmware update, select the ELXUCNA_SoftwareInstallationService class instance:

   ```
   wbemcli  -noverify ein
   'https://root:<password>@<IP>/root/emulex:elxucna_softwareinstal
   lationservice' -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. Invoke InstallFromURI using the output from step 1 and 2.

   For example:

   ```
    wbemcli cm -noverify 'https://root:<password>@<IP>/root/emulex:<Output
   of step 1>
   ```

```
InstallFromURI.URI=<Full path of fw file>,Target=<Output of step 2>
```

Enabling Logs and Collecting Symptoms

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

To enable provider logs:

1. Enumerate the ELXHBA_RecordLog (for a FC HBA) or the ELXUCNA_RecordLog (for a CNA in FCoE+NIC mode) class and note the provider log instance. If enumeration fails, perform the steps detailed in "Generating Provider Logs if Enumeration Fails" on page 11.
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/syslog.log).

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 if Enumeration Fails

To enable provider logs if enumeration fails:

1. Stop the CIMOM.
2. Create a .dmp file.
   a. To create a provider log for the Emulex FC provider, create an "emulex_fc_provider.dmp" file in the "/etc/cim/emulex" location.
   b. To create a provider log for a CNA provider (CNA in FCoE+NIC mode), create an "emulex_cna_provider.dmp" file in the "/etc/cim/emulex" location.

      Note: If the FC and CNA logs are required to be created together, use different file names for each dmp file. For example:

      /tmp/fc.txt
      /tmp/cna.txt
3. Manually enter the following two lines (without spaces):

   ```
   2,5,2
   /tmp/providerlogs.txt
   ```
4. Start the CIMOM and enumerate the Emulex classes in the "root/emulex" namespace.
5. Perform the operation that is not working as expected. The provider logs are available in </tmp/providerlogs.txt> specified in step 2.
6. Contact an Emulex technical support representative with the provider logs and the system logs (/var/log/syslog.log).

Note: Dead dump is not supported.

Executing Diagnostic Tests

You can execute a diagnostic test with an Emulex CNA or FC adapter.

Executing a Diagnostic Test with an Emulex CNA Adapter

To execute a diagnostic test with the Emulex CIM Provider:

1. Get the instance of the managed element (ethernet port). 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. Execute the 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>'
```

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
```

Results of the diagnostic test runs are available in ELXUCNA_DiagnosticCompletionRecord class instances. For example:

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

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 with 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. Execute the 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>'
```

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
```

Results of the diagnostic test runs are available in ELXHBA_DiagnosticCompletionRecord class instances. For example:

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

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

You can discover vNICs three ways:

- Determine vNICs using the CNA CIM Provider
- Determine vNICs that are hosted by the CNA in FCoE+NIC mode in a specific host
- Determine vNICs operating over the same physical port

Determining vNICs Using the CNA 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 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.

Determining vNICs Hosted by the CNA in FCoE+NIC Mode in a Specific Host

1. Find the CIM_Card instance for the CNA in FCoE+NIC mode.
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 CIM_ControlledBy instance associating the CIM_EthernetPort to a CIM_PortController instance. Follow the association to the CIM_PortController instance.
   b. Find the CIM_Realizes instance associating the CIM_PortController to a CIM_PhysicalConnector instance. Follow the association to the CIM_PhysicalConnector instance.
   c. Find the CIM_Container instance associating the CIM_PhysicalConnector to a CIM_Card instance.

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

Determining 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 CNA 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 CIM_ControlledBy instance associating the CIM_EthernetPort to an instance of CIM_PortController. Follow the association to the CIM_PortController instance.
   b. Find the CIM_Realizes instance associating the CIM_PortController to an instance of CIM_PhysicalConnector.

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

4. Troubleshooting

The following error message may appear if the CIM hosts are not properly added to the OneCommand Manager application:

```
"Unknown or invalid host specified"
```

There could be instances when the drivers, the CIM Provider, and the CIM Client on a Windows machine are all properly installed, but the CIM hosts are still not added to the OneCommand Manager application. Table 4-1 on page 15 shows the most common reasons for this.

Table 4-1 Problems Adding a CIM Host

Situation	Resolution
The machine with the specified IP is not reachable.	Verify whether the machine is reachable from the CIM Client.
The specified protocol (HTTP or HTTPS) is not supported by the CIMOM.	Most often the CIMOM is configured to use HTTPS. Therefore, if you are trying to connect with HTTP, you might get an error. Try using HTTPS instead.
The namespace is invalid.	Ensure that the namespace for the Emulex provider is 'root/emulex'.
The username or password is invalid.	Verify that the username is correct, and retype the password.

The CIMOM is not running on the ESXi host.	You can check whether the CIMOM (SFCB) is running by typing one of these commands.
	`/etc/init.d/sfcbd-watchdog status`
	or
	`ps -ef | grep sfcb`
	If the CIMOM is listening to a port other than 5988 or 5989, the connection might not take place. You can configure the SFCB CIMOM settings by editing /etc/sfcb/sfcb.cfg.

The CIM Provider is running, but enumerations are not occurring properly.	Ensure that the correct CIM Provider for the ESXi host is installed.

Note: If you still experience problems when adding the host, run the following commands on the ESXi host and send the output to the Emulex Technical Support team:

```
Svm-support dump
esxcfg-module -l
esxcfg-scsidevs -a
esxcfg-nics -l
lspci
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
```

Send the "/var/log/syslog.log" file for all of the above operations.