EMULEX ®

Iputil Utility
for Linux and Solaris

Version 2.0a14

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Introduction

The LightPulse® diagnostic utility (lputil) for Linux and Solaris is a console application that enables you to manage local Emulex® host bus adapters (HBAs).

Use lputil to do any of the following:

- Discover HBAs
- View HBA information
- Reset HBAs
- Update firmware or boot code on the local HBA
- Enable or disable the boot code on the HBA
- Download PCI Configuration
- Set Up Persistent Binding (Solaris only)
- Use the Command Line Interface (CLI)

Prerequisites

Before using lputil, ensure the following prerequisites are met:

- The Emulex driver is installed.
- The lputil utility is installed.
- If you are updating firmware, the firmware file is downloaded to a local drive. Firmware versions differ between HBA versions. Make sure you have downloaded the appropriate firmware for your HBA.
- I/O activity on the bus is quieted.
- Any software that relies on the HBA to be available is stopped or paused.

Installing lputil

To install lputil:

1. Download the lputil.tar file from the Emulex Web site to a directory on a local drive on the server.
2. Untar the contents of the lputil.tar file.
3. Run the lputil installation script.

Starting lputil

Start the utility by entering the complete path to lputil. The path reflects the default installation path. If the installation path changed, you must adjust the command appropriately.

To start lputil type:

```
/usr/sbin/lpfc/lputil
```

After lputil starts, discovered local HBAs are listed. For example:

```
LightPulse Common Utility for Version 2.0a9 (8/4/2005)
Copyright (c) 2005, Emulex Corporation

Emulex Fibre Channel Host Adapters Detected: 6
Host Adapter 0 (lpfc0) is an LP11002 (Ready Mode)
Host Adapter 1 (lpfc1) is an LP11002 (Ready Mode)
Host Adapter 2 (lpfc2) is an LP10K (Ready Mode)
Host Adapter 3 (lpfc3) is an LP9802 (Ready Mode)
Host Adapter 4 (lpfc4) is an LP11002 (Ready Mode)
Host Adapter 5 (lpfc5) is an LP11002 (Ready Mode)
```

lputil starts and the Main Menu appears.

Figure 1: Main Menu

The following table describes the Main Menu options:

Table 1: lputil Main Menu Options

Menu Selection	Description
1. List Adapters	Shows a list of HBAs discovered in the system.
2. Adapter Information	Shows HBA characteristics such as: PCI configuration parameters, HBA revision levels, wakeup parameters, IEEE address, loop map, status and counters, link status and HBA configuration parameters.
3. Firmware Maintenance	Use this option to upgrade firmware. Acceptable file formats are: absolute firmware image (.all), program image (.prg), and download with checksum (.dwc). Each file is hardware specific (LP11000, etc.).
4. Reset Adapter	Use this option during troubleshooting to isolate one HBA from other installed HBAs. In most cases, the upgrade procedure performs an automatic restart of the HBA.

Table 1: Iputil Main Menu Options (Continued)

Menu Selection	Description
5. Persistent Binding (Solaris Only)	Use this option to to permanently assign a system SCSI target ID to a specific Fibre Channel (FC) device even though the device's ID on the FC loop (D_ID) may be different each time the FC loop initializes.

Discovering HBAs

When you start lputil, all local HBAs are discovered and their information is listed including; the HBA number, instance number (such as lpfc0), board model type and whether the HBA is ready to use.

To list HBAs:

1. Start lputil. The Main Menu is displayed.

Figure 2: Main Menu

2. From the Main Menu, enter **<1>**, List Adapters. A list of HBAs is displayed as in the example below:

```
LightPulse Common Utility for Version 2.0a9 (8/4/2005)
Copyright (c) 2005, Emulex Corporation

Emulex Fibre Channel Host Adapters Detected: 6
Host Adapter 0 (lpfc0) is an LP11002 (Ready Mode)
Host Adapter 1 (lpfc1) is an LP11002 (Ready Mode)
Host Adapter 2 (lpfc2) is an LP10K (Ready Mode)
Host Adapter 3 (lpfc3) is an LP9802 (Ready Mode)
```

Viewing HBA Information

lputil enables you to view information for a selected HBA.

To view HBA information:

1. Start lputil. The Main Menu is displayed.
2. Enter **<2>**, Adapter Information. If multiple HBAs are installed, a list is displayed; select an HBA, and the Adapter Information Menu opens. If one HBA is installed, the Adapter Information Menu opens for that HBA.
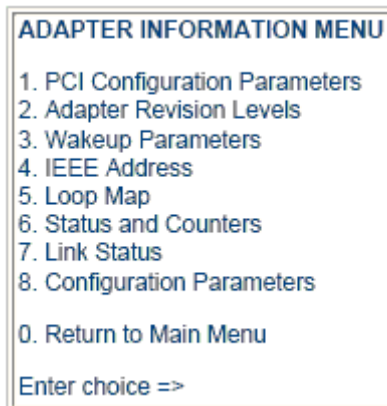

Figure 3: Adapter Information Menu

The Adapter Information Menu displays the following information:

- PCI Configuration Parameters - Parameters from the PCI configuration space on the HBA. Information includes vendor ID, device ID, base addresses, ROM address, header type, subclass and base class.
- Adapter Revision Levels - Firmware revision levels, including kernel and overlay version information.
- Wakeup Parameters - BIOS status and version, as well as SLI™ (service level interface version).
- IEEE Address - The HBA board address.
- Loop Map - If you are using arbitrated loop topology, this option shows information about your connected devices, such as AL_PA and D_ID.
- Status and Counters - Byte, frame, sequence and busy counts.
- Link Status - Activities such as link failure, loss of sync and elastic overlay.
- Configuration Parameters - D_ID topology and timeout values for link failures and loss of synchronization.

Resetting an HBA

lputil enables you to reset a local HBA.

> **Caution:** Do not reset an HBA while copying or writing files. This could result in data loss or corruption.

To reset the HBA:

1. Stop all I/O to the HBA.
2. Start lputil. The Main Menu is displayed.
3. Enter **<4>**, Reset Adapter.
4. If you have multiple HBAs, select the HBA you want to reset.

Resetting the HBA runs self tests and reestablishes links (causes discovery of devices). Once the HBA has been successfully reset, the Main Menu is displayed.

Updating an HBA's Firmware or Boot Code

lputil enables you to update firmware or boot code on a local HBA. Before you can update the firmware or boot code, you must download the latest firmware or boot code file for the HBA from the Emulex Web site.

> **Note:** If you are updating firmware on an LP1005DC, you must use lputil version 2.0a3 or later.

> **Caution:** Once a download has started, do not interrupt the process until the download is complete. If you interrupt this process, the HBA may be rendered inoperable.

To update firmware:

1. If possible, stop all I/O to the HBA.
2. Start lputil. The Main Menu is displayed.

---

3. Enter **<3>**, Firmware Maintenance.

```
FIRMWARE MAINTENANCE MENU

1. Load Firmware Image
2. Display AWC File Contents
3. Display Flash Load List
4. Display RAM Load List
5. Load PCI Configuration File
6. Disable Boot Bios


0. Return to Main Menu
Enter choice =>
```

Figure 4: Firmware Maintenance Menu

Note: For VMware, Menu item 6 is Boot BIOS Maintenance.

4. If prompted, choose the HBA on which you wish to update the firmware or boot code.

5. Enter **<1>**, Load Firmware Image.

6. Enter the full path to the firmware or boot code file.

   If you are updating firmware, the new firmware is transferred to flash ROM.

   If you are updating the firmware or boot code on a dual-channel HBA, repeat steps 3 through 5 to update the firmware on the second port.

7. Enter **<0>** twice to exit the utility.

Enabling or Disabling Boot Code

lputil allows you to enable or disable a local HBA's boot code.

Enabling the boot code is a two-step process:

1. Enable the boot code (OpenBoot, EFI or x86 BootBIOS) on the HBA using lputil. This procedure is described in this section.

2. Enable the HBA to boot from SAN (using the BIOS utility). Refer to the the documentation that accompanies the boot code for more information.

Prerequisites

- In addition to the Prerequisites listed on page 1, Boot code must already be present on the HBA.

To enable or disable the boot code:

1. Start lputil. The Main Menu is displayed.

2. Enter **<3>**, Firmware Maintenance.

3. If prompted, choose the HBA that is being updated.

4. From the Firmware Maintenance Menu, enter **<6>**, Boot BIOS Maintenance.

    - If the boot code is currently disabled, press **<1>**, Enable Boot BIOS, to enable the boot code.

    - If the boot code is already enabled, press **<1>**, Disable Boot BIOS, to disable the boot code.

- If the boot code is not currently loaded, the following message is displayed:
  ```
  There is no Boot BIOS found on adapter
  ```

5. Enter **<0>** twice to exit.

6. If you are updating x86 BootBIOS, you must also enable the HBA to boot from SAN using the BIOS utility; see the documentation that accompanies the boot code for more information.

Downloading PCI Configuration

Note: Select this option only if you are familiar with PCI configuration registers.

To download the PCI configuration data:

1. Start the lputil utility.

2. From the Main Menu, select **<3>**, Firmware Maintenance.The Firmware Maintenance Menu is displayed.

3. If you have more than one HBA in your system, select the HBA for which you want to download a PCI configuration.

4. Select **<5>**, Load PCI Configuration File. PCI configuration data is contained in .cfl files, which can be used across any supported platform.

5. Enter the region in flash ROM to download the data, and press **<Enter>**. Download one of three data sets for the PCI configuration registers.

   - Default PCI configuration region
   - PCI configuration region 1
   - PCI configuration region 2

6. Upon completion, press **<0>** to return to the Main Menu.

7. Press **<0>** to exit the utility.

8. Power down the system.

9. Restart the system to load new configuration data.

Setting Up Persistent Binding (Solaris Only)

Persistent binding allows you to permanently assign a system SCSI target ID to a specific Fibre Channel (FC) device even though the device's ID on the FC loop (D_ID) may be different each time the FC loop initializes. This capability is useful in multi-server environments that share a device. You can simplify system management by having multiple servers use the same SCSI target ID when referring to the shared FC device.

The following table describes the Persistent Binding Menu options:

Table 2: lputil Persistent Binding Options

Menu Selection	Description
1. Display Current Bindings	Displays the existing binding entries in LPFC.conf.
2. Display All Nodes	Displays a list of Emulex HBAs.
3. Duplicate Adapter Bindings	Copies the binding enties for one user selected HBA to another user selected HBA.
4. Bind Targets Manually	Enables you to select specific targets to be bound to specific HBAs.

Table 2: lputil Persistent Binding Options (Continued)

Menu Selection	Description
5. Bind Automapped Targets	Creates binding entries for targets and HBAs as they are discovered.
6. Delete Bindings	Enables you to delete specific bindings or all bindings.

To set up persistent binding:

1.   Start the lputil utility.
2.   From the Main Menu, select **<5>**, Persistent Binding. The Persistent Binding Menu is displayed.


```
PERSISTENT BINDINGS MENU

1. Display Current Bindings
2. Display All Nodes
3. Duplicate Adapter Bindings
4. Bind Target Manually
5. Bind Automapped Targets
6. Delete Bindings

0. Return to Main Menu

Enter choice =>4
```
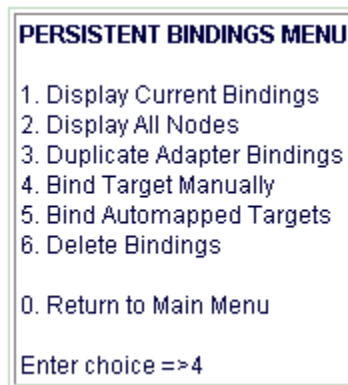
Figure 5: Persistent Bindings Menu

3.   To establish new bindings, select **<4>**, Bind Target Manually.
4.   Select an HBA.
5.   Selecting a binding method.

Note: In a fabric environment, the D_ID may change when the system is rebooted. We suggest binding to the Node Name or Port Name in a fabric environment.

---

1. By Node Name

2. By Port Name

3. By D_ID

0. Cancel

6.   Enter the Node Name, Port Name, or D_ID, depending on binding method.
7.   Enter the target number.
8.   Upon completion, press **<0>** to return to Main Menu.
9.   Press **<0>** to exit the utility.

Using the Command Line Interface

The lputil command line options enable you to perform lputil tasks if you have a non-interactive application, such as a shell script.

Table 3: lputil Commands

Command	Effect
version	Shows the lputil version.
listhbas	Shows HBA number, WWNN and WWPN.
download *<adapter-number><image-name>*	Use this option to upgrade firmware. Acceptable file formats are .all, .prg and .dwc. Each file is hardware-specific.
count	Shows the number of discovered HBAs.
rev *<adapter-number>*	Shows the following information: • BIU - bus interface unit number • Sequence Manager • Endec • Operational Firmware • Kernel • Initial Firmware: Initial firmware version number • SLI-1 - the name of the SLI-1 firmware overlay • SLI-2 - the name of the SLI-2 firmware overlay • Highest FC-PH version • Lowest FC-PH version
model *<adapter-number>*	Shows the current HBA model.
showpci *<adapter-number>*	Shows the following information: • Vendor ID • Device ID - the HBA's default device ID • Command • Status • Revision • ProgIf • SubClass • BaseClass • CacheLine • Latency • HeaderType • BIST: • Base Address information • ROM Address • CIS • SubVendor ID • SubSystem ID • Interrupt Line • Interrupt Pin

Table 3: Iputil Commands (Continued)

Command	Effect

status *<adapter-number>*	Shows the following information:
	• Active RPI Count
	• Active XRI Count
	• Xmit Byte Count - bytes transmitted by this HBA port
	• Rcv Byte Count - bytes received by this HBA port
	• Xmit Frame Count - FC frames transmitted by this HBA port
	• Rcv Frame Count - FC frames received by this HBA port
	• Xmit Seq Count - FC sequences transmitted by this HBA port
	• Rcv Seq Count: FC sequences received by this HBA port
	• Total Orig Xchgs - the total number of transmissions by this HBA port
	• Total Resp Xchgs - the number of FC exchange responses made by this port
	    Rcv PBSY Count
	    Rcv FBSY Count

linkstat *<adapter-number>*	Shows the following information: • Link failure count - the number of times the link failed. A link failure may cause a timeout. • Loss sync count - the number of times loss of synchronization has occurred. • Loss signal count - the signal loss error count. This counter increments on each lost signal. • Prim seq err count - the primitive sequence protocol error count. This counter increments upon any type of protocol error. • Invalid xmit word - the total number of invalid words transmitted by this HBA port. • CRC count - the cyclic redundancy check count. This counter increments when the data stored or transmitted failed to arrive as sent. • Prim seq timeout - the primitive sequence protocol error count. This counter increments with any type of protocol error. • Elastic overrun - the elastic buffer overrun algorithm. This counter increments when the algorithm detects a buffer overrun. • ARB timeout - the arbitrated loop timeout.
fwlist *<adapter-number>*	Shows the following information: • Test Program - the last diagnostic performed for the HBA • Functional Firmware - the Emulex firmware version number for this model of HBA • SLI-1 Overlay - the name of the SLI-1 firmware overlay • SLI-2 Overlay - the name of the SLI-1 firmware overlay
shownodes *<adapter-number>*	Shows node status, WWPN and WWNN for all visible nodes.

Table 3: lputil Commands (Continued)

Command	Effect
fcpmap *<adapter-number>*	Shows the following information: Num Entries - the number of discovered HBAs Portname - the unique 64-bit number, in hexadecimal, for the port Nodename - the unique 64-bit number, in hexadecimal, for the target Fcid 0xe4 FcpLun 0x0 Bus 0x0 Tgt 0x2 Lun 0x0 DeviceName - the operating system device name
lputil help	Shows a list of lputil commands. **Caution:** The difcode command is listed in lputil help. This command is for SBUS systems only. If the difcode command is invoked on a non-SBUS system, the HBA may be rendered inoperable.

Examples of lputil Commands

version

```
reddog:B.11.11:root[/] lputil version
2.0.a.9
```

listhbas

```
reddog:B.11.11:root[/] lputil listhbas

WWNN                            WWPN                            Board
==================================================================
20:00:00:00:c9:23:78:3f         10:00:00:00:c9:23:78:3f           0
```

count

```
reddog:B.11.11:root[/] lputil count
1
```

download

```
reddog:B.11.11:root[/] lputil download 1 bf270a5.all

Opening File...
Reading Header...
Validating Checksum...
Initializing Host Adapter...
Erasing Flash ROM Sectors...
100% complete
Loading Image...
100% complete
Updating Wakeup Parameters...
Resetting Host Adapter...
Image Successfully Downloaded
```

rev

```
reddog:B.11.11:root[/] lputil rev 0

                  BIU: 2002506D
     Sequence Manager: 00000000
                Endec: 00000000
 Operational Firmware: SLI-2 Overlay
               Kernel: LP8K 2.10a3
     Initial Firmware: Initial Load 3.90a7 (DS3.90A7 )
                SLI-1: LP8K SLI-1 Overlay 3.90a7 (D1D3.90A7 )
                SLI-2: LP8K SLI-2 Overlay 3.90a7 (D2D3.90A7 )
 Highest FC-PH Version: 4.3
  Lowest FC-PH Version: 4.3
```

model

```
reddog:B.11.11:root[/] lputil model 0
LP8K_V2
```

showpci

```
reddog:B.11.11:root[/] lputil showpci 0
            Vendor ID: 10DF
            Device ID: F800
              Command: 0157
               Status: 0280
             Revision: 02
               ProgIf: 00
             SubClass: 04
            BaseClass: 0C
            CacheLine: 08
              Latency: F8
           HeaderType: 00
                 BIST: 00
       Base Address 0: F2FFB004
       Base Address 1: 00000000
       Base Address 2: F2FFC004
       Base Address 3: 00000000
       Base Address 4: 0000FD01
       Base Address 5: 00000000
          ROM Address: 00000000
                  CIS: 00000000
         SubVendor ID: 10DF
         SubSystem ID: F800
       Interrupt Line: 01
        Interrupt Pin: 01
```

status

```
reddog:B.11.11:root[/] lputil status 0

      Active RPI Count: 0000
      Active XRI Count: 0000
       Xmit Byte Count: 0000083E
        Rcv Byte Count: 000135F6
      Xmit Frame Count: 000096AC
       Rcv Frame Count: 00012D3D
        Xmit Seq Count: 000096AC
         Rcv Seq Count: 00012D3D
      Total Orig Xchgs: 000096A3
      Total Resp Xchgs: 0000000C
        Rcv PBSY Count: 00000000
        Rcv FBSY Count: 00000000
```

linkstat

```
reddog:B.11.11:root[/] lputil linkstat 0

    Link Failure Count: 00000001
      Loss Sync Count: 00000009
     Loss Signal Count: 00000000
     Prim Seq Err Count: 00000000
      Invalid Xmit Word: 00000004
             CRC Count: 00000000
       Prim Seq Timeout: 00000000
        Elastic Overrun: 00000000
            ARB Timeout: 00000000
```

fwlist

```
reddog:B.11.11:root[/] lputil fwlist 0

        1. Test Program: NLPort LoopBack
        2. Functional Firmware: DS3.90A7
        3. SLI-1 Overlay: D1D3.90A7
        4. SLI-2 Overlay: D2D3.90A7
```

shownodes

```
reddog:B.11.11:root[/] lputil shownodes 0

Visible Nodes:
Node               Target  WWPN               WWNN
----               ------  ---------          --------
In Transition          0  10-00-00-00-c9-21-6b-11  20-00-00-00-c9-21-6b-11
In Transition          0  10-00-00-00-c9-2e-09-d3  20-00-00-00-c9-2e-09-d3
In Transition          0  10-00-00-00-c9-2e-50-df  20-00-00-00-c9-2e-50-df
In Transition          0  10-00-00-00-c9-23-23-77  20-00-00-00-c9-23-23-77
In Transition          0  10-00-00-00-c9-23-78-3f  20-00-00-00-c9-23-78-3f
Automapped FCP Node    2  50-06-09-46-70-40-11-d4  50-06-09-46-70-00-11-d4
Automapped FCP Node    1  50-00-00-00-00-40-00-e8  50-00-00-00-00-00-00-e8
```

fcpmap

```
reddog:B.11.11:root[/] lputil fcpmap 0
Num Entries 0x2
Portname: 50:06:09:46:70:40:11:d4
Nodename: 50:06:09:46:70:00:11:d4 Fcid 0xe4 FcpLun 0x0
Bus 0x0 Tgt 0x2 Lun 0x0 DeviceName lpfc:0:2:0
Portname: 50:00:00:00:00:40:00:e8
Nodename: 50:00:00:00:00:00:00:e8 Fcid 0xe8 FcpLun 0x0
Bus 0x0 Tgt 0x1 Lun 0x0 DeviceName lpfc:0:1:0
```