HP ProLiant Lights Out-100 User Guide
For HP ProLiant G6 and G7 Servers

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Part Number 616302-001

Intended audience

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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1 Operational overview

Overview

This guide explains the standard and optional operational features of the HP Onboard Administrator Powered by Lights-Out 100 (LO100) available for the following HP ProLiant server models:

- ML110 G6 server
- ML150 G6 server
- DL120 G6 server
- DL160 G6 server
- DL160se G6 server
- DL170h G6 server
- DL180 G6 server
- SL160z G6 server
- SL170z G6 server
- SL2x170z G6 server
- ML110 G6 server
- DL120 G6 server
- HP ProLiant DL165 G7 Server
- HP ProLiant SL165z G7 Server

New features

This release of LO100 adds support for the following:

- HP ProLiant SL 170s G6 Server
- VLAN tagging

Server management

LO100 delivers basic remote control of vital server resources, supports IPMI 2.0, DCMI 1.0, and provides system administrators with access to the server at any time, even before an operating system is installed on the server.

LO100 provides text mode console redirection, DMTF SMASH compliant command line interface, and browser access to many of the same system management functions. You can access LO100 through a dedicated Ethernet port or through the server serial port.

Server management features

With LO100, you can perform the following tasks:

- Access a remote graphic console (Virtual KVM)
- Access the serial console of the host operating system over the network using standards-based client utilities
- Switch between serial console redirection or the LO100 command line interface
- Communicate securely using SSL and SSH
- Remotely control the power button of the server (power on and off the server), or perform warm or cold server reboots
- Remotely monitor fan speed and system power state (S0 or S5)
- Access the system event log
- Access virtual media

- Configure TCP/IP settings for the LO100 NIC
- Control user access
- Discover, identify, and launch LO100 from HP Systems Insight Manager
- Access LO100 and server controls using a standard browser or new industry-standard SMASH CLP command line interface
- Access command line help
- Manage the server with IPMI 2.0 and DCMI 1.0 compliant applications
- Access Telnet

Not all of the features displayed and described in the guide are available on all systems. To verify which features are supported on your system, see "LO100 standard features" and "LO100 optional (licensed) features" for more information.

LO100 standard features

For HP ProLiant ML110 G6, ML150 G6, DL120 G6, DL160 G6, DL160se G6, DL170h G6, DL180 G6, SL160z G6, SL170z G6, SL2x170z G6, and SL 170s G6 servers; and HP ProLiant DL165 and SL165z G7 servers, LO100 standard features include the following:

- IPMI 2.0 and DCMI 1.0 elements available through the operating system (where supported)
- IPMI-over-LAN support
- Web browser access (HTTP) to power control, system event log, hardware status, and license key activation of optional features
- SMASH CLP interface access to remote power control, system event log, hardware status, and operating system serial console
- Support for SSL, SSH, and IPMI 2.0 security with factory-default self-signed certificates and keys

LO100 optional (licensed) features

LO100 optional features are activated with the purchase of the Lights-Out 100i Advanced Pack package. The Lights-Out 100i Advanced Pack includes:

- Virtual media access
- Virtual KVM

2 Configuration

Configuring LO100 with the LO100CFG utility

The SmartStart Scripting Toolkit is a server deployment product that delivers unattended automated installation for high volume ProLiant server installations. Available in Win32 and Linux editions, the Toolkit supports ProLiant DL and ML 300, 500, 700 and ProLiant BL servers in both Windows and Linux environments and now includes limited ProLiant 100 series support. The toolkit includes a modular set of utilities and important documentation that describes how to apply these new tools to build an automated server deployment process.

The toolkit contains an important tool for high volume LO100 configuration and deployment ◎ the LO100CFG utility. Using this and other configuration tools in the SmartStart Scripting Toolkit will allow allow rapid, scripted installation of LO100 and other 100 series configurations. See the following Web page for the SmartStart Scripting Toolkit user guides for Windows and Linux, download links, and additional information regarding the LO100CFG utility: http://h18000.www1.hp.com/products/servers/management/toolkit/index.html

Configuring network access

Through your server network connection, you can access the remote management CLP, verify POST (power-on self test) remotely, access the server through a web browser, and access the BIOS Setup Utility remotely.

To configure network access:

1. Connect a standard Ethernet cable from the LO100 NICto a network jack.
2. Press the **F10** key to access BIOS.
3. Obtain the DHCP IP address.
   - If you are using ML110 G6 or DL120 G6:
     a. Press the right arrow (→) key to scroll to the Advanced tab, and then scroll down to IPMI. Press the **Enter** key.
     b. Click **LAN Settings,** and then click **Set IP Address Assignment to DHCP.**
   - If you are using or ML150 G6, press the right arrow (→) key to scroll to the Advanced tab, and then scroll down to IPMI.
   - If you are using DL160 G6, DL160se G6, DL170h G6, DL180 G6, SL160z G6, SL170z G6, SL2x170z G6, SL 170s G6 servers, or DL165 or SL 165 G7 servers, press the right arrow (→) key to scroll to the Advanced tab, and then use either of the following methods:
     a. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.
     b. Click **Set LAN Configuration.**

   Obtain the IP address from BIOS Setup Utility under Advanced/IPMI Configuration/LAN Configuration. For more information, see "Obtaining a DHCP IP address from the BIOS Setup Utility ("Obtaining a DHCP IP address from the BIOS Setup Utility").

   Alternatively, you can perform one of the following methods:

   - Look at the DHCP clients table.
   - Look at the DNS client records for an entry of LO100<serial server number>. (The default DNS host name for each LO100 is unique.)

   By default, LO100 has DHCP enabled and automatically negotiates an IP address.
4. With the DHCP IP address, use Telnet to log in to the remote management CLP, or use a web browser to access the HTML interface.

To set up a static IP address, see "Setting up a static IP address from the BIOS Setup Utility".

Configuring user accounts

LO100 supports four accounts types, with varying levels of permissions to view and control features. For more information on user accounts, see the "User administration" section. Two accounts are available by default, one of type administrator and one of type operator.

The administrator account enables the user to execute the full set of CLP commands and change management processor configuration. The default administrator account user name is *admin*, and the default password is *admin*.

The operator account enables the user to execute common commands and functions but restricts access to specific functions, such as adding and changing user account information and changing the configuration of the management processor. HP recommends logging in with the operator account to perform common functions. The default user name is Operator, and the default password is Operator.

For more information on how to log in to LO100, see the "Logging in to LO100" section.

Accessing BIOS Setup Utility and using function keys

Throughout the document, the F10 key is listed as the standard method of accessing the BIOS Setup Utility, saving changes, and exiting the utility. In some cases, the function keys (F keys) might not pass through the telnet client correctly to the remote system. If this occurs, use the following ESC key equivalents:

- F8–ESC+8
- F10–ESC+0
- F12–ESC+@

Using the serial port

The server serial port provides basic serial port functionality and serves as an interface to LO100. You can configure the system serial port for exclusive use with LO100.

CAUTION: After enabling the serial port for use with LO100, legacy serial devices might not function correctly if attached to the serial port.

You must configure the LO100 serial port hardware parameters to work with your respective serial port communications software. LO100 serial port configuration is controlled through the BIOS Setup Utility.

Enabling serial access

1. Power up the server.
2. When POST displays the message, `ROM-Based Setup`, press the **F10** key. If the server has an administrator password configured, the system prompts you to enter the password. If the server does not have a password configured, the main screen of the BIOS Setup Utility appears.
3. Press the right arrow (→) key to navigate to the Advanced menu.
4. Choose one of these options:

NOTE: If you change the Serial Port Assignment, the BMC IP Address resets. The BMC IP address might not be the same after reboot.

- On ML110 G6 and DL120 G6 servers:
  a. Press the down arrow (↓) key to scroll to Console Redirection.
  b. Set the BIOS Serial Console Port to **Enabled.**
- On ML150 G6 servers:

a. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
b. Set Serial Port Assignment to **BMC.**
c. Set Serial Port Switching to **Enabled.**
d. Set Serial Port Connection Mode to **Direct.**

- On DL160 G6, DL160se G6, DL170h, DL180 G6, SL160z G6, SL170z G6, SL 170s G6, SL2x170z G6 servers and DL165 and SL165z G7 servers:
  a. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.
  b. Scroll down to Serial Port Configuration.
  c. Set Serial Port Assignment to **BMC.**
  d. Set Serial Port Connection Mode to **Direct.**

5. Press the **F10** key to save and exit.

Configuring serial port

1. Power on the server by pressing the Power On/Off button on the front panel.
2. When POST displays the message, `ROM-Based Setup`, press the **F10** key. If the server has an administrator password configured, the system prompts you to enter the password. If the server does not have a password configured, the main screen of the BIOS Setup Utility appears.
3. Press the right arrow (→) key to navigate to the Advanced menu.
4. Press the down arrow (↓) key to scroll to IO Device Configuration, or, if you are using SL160z G6 servers or DL165 or SL165z G7 servers, scroll to Super IO Configurations. Press the **Enter** key.
5. Set Embedded Serial Port to **3F8/IRQ4.**
6. From the Remote Access Configuration, configure the BIOS Serial Console as follows:
   - BIOS Serial Console-Enabled
   - EMS Support-Disabled (for ML150 G6)
   - Base Address/IRQ-3F8h, 4
   - Serial Port Mode-9600 8, n, 1
   - Flow Control-None
   - Redirection after BIOS/POST-Enabled
   - Terminal Type-VT100
7. For DL 165 G7 and SL 165 G7 servers, from the Remote Access Configuration, configure the BIOS Serial Console as follows:
   - BIOS Serial Console Port-Enabled
   - BIOS Serial Console Port Baud Rate-[115200 8, n, 1]
   - Redirection after BIOS POST-Always
   - Terminal Type-ANSI
   - VT-UTF8 Combo Key Support-Enabled
8. Review the serial port settings, and make sure the settings match the serial port communications software settings used to connect to LO100.
9. To return to the previous screen, press the **Esc** key, or to save the changes and exit Setup, press the **F10** key.

Using TCP/IP over Ethernet management port

You can configure LO100 LAN port access using two different Ethernet ports: the dedicated 10/100 LO100 management port or through a side-band connection using the server embedded NIC. The side-band, shared, or UMP options utilize one server Ethernet port for both server

network traffic and LO100 network traffic reducing the number of network cables that you must attach to the server.

NOTE: Not all servers come with the option of selecting a sideband or dedicated NIC. Some have only one option.

Selecting a shared Ethernet management port

1. Power on the server by pressing the Power On/Off button on the front panel.
2. When POST displays the message, `ROM-Based Setup`, press the **F10** key. If the server has an administrator password configured, the system prompts you to enter the password. If the server does not have a password configured, the main screen of the BIOS Setup Utility appears.
3. Press the right arrow (→) key to navigate to the Advanced menu.

NOTE: On the ML150 G6, ML110 G6, and DL120 G6 systems, the Virtual KVM and Virtual Media functions are not available when used with the Shared NIC function. If you want LO100 Advanced Pack features on the ML150 G6, use the dedicated NIC mode.

4. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.
5. Scroll to the LAN Configuration menu by pressing the down arrow (↓) key. Press the **Enter** key.
6. Choose one of these options:
   - On ML110 G6 or DL120 G6, press the down arrow (↓) key to IPMI. Press the **Enter** key, and then set BMC NIC Allocation to **Shared.**
   - On ML150 G6, set BMC NIC Mode to **Shared.**
   - On DL160 G6, DL160se G6, DL170h G6, DL180 G6, and SL160z G6, SL170z G6, or SL2x170z G6, set BMC NIC Allocation to **Enabled.**
   - On DL165 G7, press the down arrow (↓) key to BMC NIC Allocation, then select Dedicated/Shared. Press the **Enter** key.
7. To return to the previous screen, press the **Esc** key, or to save the changes and exit Setup, press the **F10** key.

The TCP/IP over Ethernet management port, whether dedicated or shared, is a standard Ethernet 10/100Mb interface that connects to the network using a standard Ethernet cable. Before using the dedicated management port, you must determine the DHCP IP address or set a static IP address.

Obtaining a DHCP IP address from the BIOS Setup Utility

By default, LO100 has DHCP enabled and automatically negotiates an IP address. To view the DHCP IP address, run the BIOS Setup Utility or retrieve the DHCP IP address using CLP through the serial port connection. To view the DHCP IP address using the BIOS Setup Utility:

1. Power on the server by pressing the Power On/Off button on the front panel.
2. When POST displays the message, `ROM-Based Setup`, press the **F10** key. If the server has an administrator password configured, the system prompts you to enter the password. If the server does not have a password configured, the main screen of the BIOS Setup Utility appears.
3. Press the right arrow (→) key to navigate to the Advanced menu.
4. To obtain the DHCP IP address, choose one of these options based on the server model:
   - On ML110 G6 and DL120 G6 servers:

a. Press the down arrow (↓) key to navigate to IPMI. Press the **Enter** key.
b. Press the down arrow (↓) key to navigate to LAN Settings. Press the **Enter** key.
c. Set IP Address Assignment to **DHCP.**

- On ML150 G6 servers:
  a. Press the down arrow (↓) key to navigate to IPMI.
  b. Scroll to BMC LAN Configuration. Press the **Enter** key.
- On DL160 G6, DL160se G6, DL180 G6, and SL160z G6 servers:
  a. Press the down arrow (↓) key to navigate to IPMI Configuration.
  b. Scroll to Set LAN Configuration, and then scroll to BMC LAN Configuration. Press the **Enter** key.
- On DL170h G6, SL170z G6, SL170s G6, and SL2x170z G6 servers:
  a. Press the down arrow (↓) key to navigate to IPMI Configuration.
  b. Scroll to LAN Configuration, and then scroll to DHCP IP Source.
  c. Select either of the following:
  — To set BMC NIC to DHCP, scroll down to DHCP IP Source, and then to enable, press the **Enter** key.
  — To save all changes and exit, press the **F10** key.

5. To return to the previous screen, press the **Esc** key, or to save the changes and exit Setup, press the **F10** key.

To configure or change your network settings, see ""Network settings".

Using the DNS naming feature

The DNS naming feature enables you to reference the server name assigned to the server without having to know the server IP address or obtaining the IP address for a given server. This ability to reference the server name occurs after the server has registered its name with the DNS, using the default naming sequence assigned by LO100, `LO100 - {Server Serial Number}`. (For example, `LO100 - CNQ123456`.)

NOTE: This requires DHCP and will not work with static IP addresses.

To obtain the serial number, look at the pull-out tab usually located in the front panel of the server.

You can change the server name through the Network Settings page of the LO100 web interface.

You can also change the server name through the telnet interface.

To do this, type the following in the telnet interface:

```
cd map1/nic1
set oemhp_hostname=<new_name>
```

where

`<new_name>`

is the new DNS host name your server will have.

To retrieve a server IP address using the DNS naming feature, use a system connected to the same network, open a DOS command prompt, and then type `nslookup {server name}`. (For example, `nslookup {CBQ123456}`.)

Depending on your DNS server configuration, it might take up to 45 minutes for the DNS to register a server name. For more DNS options in LO100, see "Configuring network settings using a web browser".

Setting up a static IP address from the BIOS Setup Utility

By default, LO100 has DHCP enabled and automatically negotiates an IP address. To disable DHCP and enable a static IP address:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. To set your network BIOS settings, choose one of these options:
   - On ML110 G6 and DL120 G6 servers:
     a. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
     b. Press the down arrow (↓) key to scroll to the LAN Settings menu. Press the **Enter** key.
     c. On IP Address Assignment, select **Static.**
   - On ML150 G6 servers:
     a. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
     b. Press the down arrow (↓) key to scroll to the end, and then select **BMC LAN Configuration.**
     c. On BMC LAN Configuration, select **Static.**
     d. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the **Tab** key to move between address fields).
   - On DL160 G6, DL160se G6, DL180 G6, and SL160z G6 servers:
     a. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
     b. Press the down arrow (↓) key to scroll to the LAN Configuration menu. Press the **Enter** key.
     c. On DHCP IP Source, select **Disabled.**
     d. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the **Tab** or period (.) key to move between address fields).
   - On DL170h G6, SL170z G6, SL170s G6 and SL2x170z G6 servers:
     a. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.
     b. Press the down arrow (↓) key to scroll to the LAN Configuration menu. Press the **Enter** key.
     c. Press the down arrow (↓) key to scroll to the end, and then select **DHCP IP Source.**
     d. Select either of the following:
     — To set BMC NIC to Disabled, press the **Enter** key.
   - On DL165 G7 and And SL 165 G7 servers:
     a. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.
     b. Press the down arrow (↓) key to scroll to the LAN Configuration menu. Press the **Enter** key.
     c. Press the down arrow (↓) key to scroll to the BMC LAN Configuration menu. Press the **Enter** key.
     d. Select DHCP/static, then press the **Enter** key.
     — To save all changes and exit, press the **F10** key. To save all changes and exit, press the **F10** key.
4. Press the **F10** key to save and exit.

To restore DHCP, see "Configuring network settings using the BIOS Setup Utility."

Enabling or disabling Telnet and HTTP services from the BIOS Setup Utility

On ML110 G6 and DL120 G6 servers:

1. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
2. Press the down arrow (↓) key to scroll to the LAN Settings menu. Press the **Enter** key.
3. Press the down arrow (↓) key to scroll to the Telnet Services and HTTP Services. Press the **Enable** or **Disable** key as appropriate.

On ML150 G6 servers:

1. Select **Advanced>IPMI.**
2. Set the following:
   - BMC HTTP Service-Enabled or Disabled, as appropriate
   - BMC Telnet Service-Enabled or Disabled, as appropriate

On DL160 G6, DL160se G6, DL180 G6, and SL160z G6 servers and DL165 and SL165z G7 servers:

1. Select either of the following:
   - If you are enabling or disabling Telnet, select **Advanced>IPMI Configuration>LAN Configuration>BMC Telnet Service.**
   - If you are enabling or disabling HTTP, select **Advanced>IPMI Configuration>LAN Configuration>BMC HTTP Service.**
2. To enable or disable, press **Enter.**
3. Press the **F10** key to save all changes and exit.

On DL170h G6, SL170z G6, SL170s G6, and SL2x170z G6 servers:

1. Press the right arrow key (→) to scroll to the Advanced tab. Press the **Enter** key.
2. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.
3. Press the down arrow (¯↓) key to scroll to Set LAN Configuration. Press the **Enter** key.
4. Scroll to LAN Protocol Control. Press the **Enter** key.
5. Press the **Enable** or **Disable** key to enable or disable the Telnet or HTTP as appropriate.

TCP and UDP port numbers used by LO100

The following table lists the TCP and UDP port numbers used by the various LO100 network-accessible features. You can use this information to configure networking infrastructure or security settings.

Port number	Protocol	Support	Embedded by default
22	SSH	Secure Shell connections	Yes
23	Telnet	Command line interface, Remote text console	Yes
69	TFTP	Firmware upgrade	Yes
80	HTTP	Firmware upgrade	Yes
162	SNMP trap	Web-based user interface and LO100 Virtual KVM	Yes
443	HTTPS	Secure access to the web-based user interfaceVirtual KVM	Yes
623	IPMI RMCP+	IPMI-over-LAN connections	Yes
664	Secure IPMI RMCP+	IPMI-over-LAN connections	Yes
5901	Storage	Storage	Yes

Updating the firmware

To update the LO100 firmware, use the ROMPaq utility. Downloads for the ROMPaq utility are available on the HP website (http://www.hp.com/support). For more information about using the ROMPaq utility, refer to the HP website (http://www.hp.com/servers/manage).

NOTE: LO100 does not support ROMPAQ flashing from virtual media.

After the ROMPaq utility flashes the selected device, cycle power manually to reboot the operating system.

Remotely updating the firmware

Use the `load` command to remotely update the LO100 firmware. The firmware file must be an uncompressed firmware image file created using the DOS ROMPAQ utility found on the Lights-Out 100 Firmware Upgrade Diskette Utility, which is available for download from the HP website (http://www.hp.com/servers/lights-out).

To create an uncompressed image file, enter the following command at the DOS prompt:

```
ROMPAQ /D <infile> <outfile>
```

where <*infile*> is the ROMPAQ firmware image file and <*outfile*> is the file name for the uncompressed binary image file. For example:

```
ROMPAQ /D cpqq0801.D14 ldrImage.bin
ROMPAQ Firmware Upgrade Utility, Version 5.02 (R)
Copyright (c) Hewlett-Packard Corporation, 1994-2006
Input file:   CPQQ0801.D14
Output file:  LDRIMAGE.BIN
```

The `load` command is used to retrieve a binary image from a specific source location (specified as a URL) and place it at the specified target address.

The `load` command can download and flash a firmware image file using TFTP from the specified location.

To flash the firmware using TFTP settings:

- On a Windows operating system:
  1. Copy the BMC firmware into a directory on the server.
  2. Run TFTP by launching the executable file tftpd32.exe.
  3. Navigate to **TFTP configuration>Settings,** and set Timeout to **4** seconds and Max Retransmit to **10.**
  4. Enter the **Base Directory** and **TFTP Server IP Address.** Base Directory is the path where the BMC firmware is residing. TFTP Server IP Address is the IP address of the TFTP server (for example, 10.141.38.157).
- On a Linux operating system:
  1. Navigate to **Applications>Systems Settings>Server Settings>Services** and make sure that TFTP and xinetd are running.
  2. Open the `/etc/xinetd.d/tftp` file and modify the parameter *server_args* to include `-T 4000000`. For example,`server_args = -c -s /tftpboot -T 4000000`

     While in this directory, to modify server parameters, type `gedit`.
  3. Reset xinetd to allow it update. Open a terminal and type service `xinetd` restart. On non-RHEL Linux platforms, open the Services menu and reset `xinetd` manually.
  4. If a firewall is enabled, disable it or modify the settings to allow the firewall to connect to the TFTP port. To change the firewall settings, navigate to **Applications>System Settings>Security Level,** and enter `69:udp` in the parameter of the other port.
  5. Place the image file in the `/tftpboot` folder, which is in the TFTP servers root directory.

To update the firmware, log in to LO100 as the administrator through the CLP interface, and issue the `load` command to upload and install the firmware from the map1/firmware directory.

1. Start a CLP session. To access CLP:
   a. Navigate to **Start>All Programs>Accessories>Command Prompt**.
   b. At the command prompt, enter `telnet <IP address>`.
2. At the CLP prompt, enter `cd map1/firmware`.
3. At the CLP prompt, enter

   ```
   load -source <URI> -oemhpfiletype csr
   ```

   where:

   - *<URI>* is the `//<tftpserver IP>/<filename>` to be downloaded.
   - *<tftp server IP>* is the URL or IP address of the TFTP server containing the firmware.
   - *<filename>* is the file name of the image file (LdrImage.bin in this example).

   For example, enter:

   ```
   load -source //10.141.38.157/LdrImage.bin -oemhpfiletype csr
   ```

   Alternatively, you can also install the firmware through a browser. For more information, see "Installing firmware through a web browser".

   The TFTP application might report an error in the early part of the firmware upload process, during the firmware image validation process. An error does not necessarily indicate failure of the firmware upload and does not prevent successful firmware uploads. A successful firmware upload typically takes several minutes. After the firmware upgrade process is complete, verify that the new version of the firmware is active.

   If the firmware upgrade process fails after sufficient time (at least 5 minutes), reboot the server, and verify that the previous version of the firmware is still active. Always reboot the server before retrying the firmware upgrade process.

   Do not reset the system or the BMC during download; the server may become corrupt.

   After installing the firmware, the IP address of the server might reset to the default value. You must locally reset the IP address to the desired address.

NOTE: After using the `load` command LO100 will reset ending your CLP interface session. You must reconnect to the CLP interface.

NOTE: When you use the CLP load command with TFTPD32, HP recommends using a 4-second timeout and 10 retries.

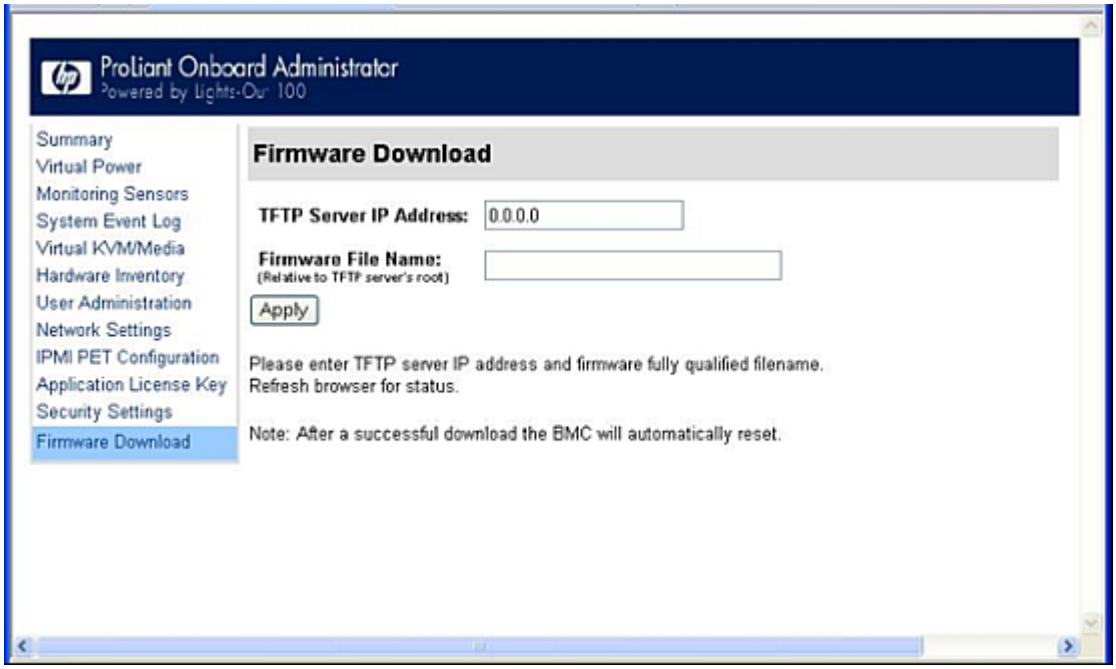
Reset the system after the download is complete to load the SDRR and CFGs so that LO100 can recognize the individual server platform and not a "ProLiant Generic G6."

Installing firmware through a web browser

The Firmware Download page enables you to install new firmware images. To install firmware through the browser:

1. Log in to LO100 as an administrator.
2. On the browser main menu recognition box, click **Firmware Download**.
3. In the TFTP server IP address field, enter the IP address of the TFTP server.
4. Enter the file name of the firmware image in the File Name field. Include the path relative to the TFTP server root in the file name.
5. If you are using Linux to install the firmware:
   a. Place the image file in the `/tftpboot` folder, which is in the TFTP servers root directory.
   b. Enter the file name of the firmware image in the Firmware File name field. Include the path to the TFTP server root in the file name.

6. Click **Apply**. The BMC is reset.
7. Reconnect to the web browser. A typical flash can take several minutes.



Updating the firmware through the online flash utility

The Lights-Out 100 Online Flash Utility allows a user to update the BMC firmware through a supported operating system without resetting the server. The online flash utilities may be downloaded at http://www.hp.com/ under the downloads section for each platform.

Supported operating systems include the following:

- Red Hat Enterprise Linux 5.4 (i386, x86_64)
- Red Hat Enterprise Linux 4.8 (i386, x86_64)
- SuSE Linux Enterprise Server 10 (i386, x86_64)
- SuSE Linux Enterprise Server 11 (i386, x86_64)
- Windows Server 2008 (x86, x64) - All Editions
- Windows Server 2008 R2 – All Editions

NOTE: Windows Server 2003 is not supported.

To use the online flash component on a Windows operating system, perform the following steps:

1. Copy the LO-100 online flash utility to a directory on the server file system.
2. Double click the executable file.
3. Click “Install.”
4. Wait for the installation process to complete.

NOTE: This may take up to 45 minutes on some servers. Do not shut down the server or interrupt the flash process.

5. Click “Finish.” No restart is necessary upon completion.

To use the online flash component on a Linux operating system, perform the following steps:

1. Copy the LO-100 online flash utility to a directory on the server file system.
2. Open a bash shell at the directory where the online flash component is located.

3. Execute the following commands:

   ```
   chmod 777 CPxxxxxx.scexe
   ./CPxxxxxx.scexe
   ```

4. Wait for the installation process to complete.



NOTE: This may take up to 15 minutes on some servers. Do not shut down the server or interrupt the flash process.

5. Click “Finish.” No restart is necessary upon completion.

3 Using LO100

Using SSL

SSL is a protocol used to transmit private documents through the Internet and uses a private key or certificate to encrypt data transferred over the SSL connection. The Lights-Out 100 provides security for remote management in distributed IT environments by using an industry-standard encryption protocol for data traveling on unsecured networks. SSL is available by default.

LO100 comes preinstalled with a certificate. To install a user-specific certificate, see the one-time "Importing a certificate" setup procedure.

If you cannot access the login page, you must verify the SSL encryption level of your browser is set to 128 bits. The SSL encryption level within the management processor is set to 128 bits and cannot be changed. The browser and management processor encryption levels must be the same.

To use the preinstalled certificate, enter https://ipaddress in the address line of the browser, which uses SSL-encrypted communication. Enter http://ipaddress to use non-SSL encrypted communication.

Using SSH

SSH is a Telnet-like protocol for logging in to and executing commands on a remote machine, which includes security with authentication, encryption, and data integrity features. The Lights-Out 100 remote management processor can support simultaneous access from four SSH clients. After SSH is connected and authenticated, the command line interface is available. LO100 supports two simultaneous SSH connections. SSH is available by default.

LO100 supports the SSH version 2 and the following client utilities:

- PuTTY 0.54 or later
- OpenSSH

LO100 comes preinstalled with a certificate. To install a user-specific certificate, see the one-time "Importing a certificate" setup procedure.

Using the SSH utility

When using a SSH utility to connect to a server for the first time, the utility prompts you to accept the server public key, sometimes referred to as a host key. Accepting this key authorizes the utility to store a copy of the public key in its own database. The utility recognizes the server when future connections are attempted by comparing the public key to the one stored in its database.



NOTE: Logging in to an SSH session could take up to 90 seconds. Depending on the client used, you might not see on-screen activity during this time.

To access the remote management processor using SSH:

1. Open an SSH window.
2. When prompted, enter the IP address, login name, and password.

Using the PuTTY utility

PuTTY 0.54 is a terminal emulation product that includes support for telnet and the SSH protocol. PuTTY 0.54 is available for download from the Internet.

- To start a PuTTY session, double-click the PuTTY icon in the directory in which PuTTY is installed.
- To start a PuTTY session from the command line:
  - To start a connection to a server called host, enter:

    ```
    putty.exe [-ssh | -telnet | -rlogin | -raw] [user@]host
    ```

  - For telnet sessions, you can also enter the following alternative syntax:

    ```
    putty.exe telnet://host[:port]/
    ```

  - To start an existing saved session called session name, enter:

    ```
    putty.exe -load "session name"
    ```

When you press **Enter** using PuTTY versions earlier than 0.54, two line feeds might appear on a single line feed. To avoid this issue and for best results, HP recommends using version 0.54 or later.

Using the OpenSSH utility

OpenSSH is a free version of the SSH protocol available for download on the Internet.

To start an OpenSSH client in Linux, at the command prompt enter:

```
ssh -l loginname ipaddress/dns name
```

Using CLP

HP has worked with key industry partners within Distributed Management Task Force, Inc. to define an industry-standard set of commands. The SMASH suite will standardize manageability interfaces for servers. The Lights-Out 100 remote management processor implements the command set defined in the *Server Management Command Line Protocol Specification, 1.00 Draft*. The CLP replaces the simple CLI that was released previously and is no longer supported.

The management processor functionality accessible from the SMASH CLP is a low-bandwidth interface and provides similar functionality to the web interface. The CLP is designed for users who prefer a nongraphical interface. The CLP is accessible through the following methods:

- Telnet
- SSH connection
- Physical serial port

LO100 CLP supports four simultaneous SSH connections, two SSH connections and two Telnet connection, or one SSH connection and three Telnet connections. You cannot have more than four simultaneous SSH connections and up to three (Telnet and SSH) connections at a time.

CLP syntax

The general syntax of CLP command is:

```
<verb> <target> <option> <property>
```

- **Verbs**— The following verbs are supported:
  - `cd`
  - `help`
  - `load`
  - `reset`
  - `set`
  - `show`

- start
- stop
- exit
- version

- **Target** —The default target is the /. The target can be changed by the cd command or by specifying a target on the command line.
- **Options** — The following options are valid:
  - -help/-h
  - -all/-a
- **Properties** are the attributes of the target that can be modified.
- **Output** —The output syntax is text.

The valid Boolean values for any command are *true* and *false.*

General notes

If the commands on the CLP command span more than one line, you cannot navigate between different lines.

Operating system-specific notes

- The Microsoft® Windows 2000 telnet client does not support the Functions keys F1 through F12, Insert, Home, and End keys. These keys will not work in a Lights-Out 100 command line session.
- The Backspace key in the Lights-Out 100 CLP implementation is mapped to the value 0x8. Some client operating systems, Novell Linux Desktop and Red Hat Enterprise Linux 4 Desktop, map the Backspace key to the value 0x7f, which is used for the Delete key in the Windows telnet client. The Backspace key will not work from a client from which it has value of 0x7f. For the Linux clients, using the Home or the End key enables the Lights-Out 100 CLP service to remap the Backspace key to use the value 0x7f, making the key functional.

In the Windows PuTTY client, the Backspace key can be mapped to a value of 0x8 by changing the setting for Terminal Keyboard to Control-H.

Base commands

- The help command displays context-sensitive help.

  Entering help displays all the supported commands. Entering

  <*command*> help

  displays the help message specific to that command.

  - Help for verbs

    Calling help for a verb returns the general syntax and usage associated with issuing that verb. Calling help for a verb that is not present in the current directory returns an [Unsupported Command] message. The following examples are all valid ways to call help for a verb.

    - /./-> help show

      Usage:

      show [<target>][<options>][<properties>]

    - /./-> show -h

      Usage:

      show [<target>][<options>][<properties>]

    - /./-> show -help

      Usage:

```
show [<target>][<options>][<properties>]
```

- `/./->`

— `Help` for targets

Calling help for a target returns any information about the target and its contents. You can call help for any target that is not contained in the current directory (`help map1` can be called from `system1`).

- `/./-> system1 -h`

  `Invalid command`

- `/./-> system1 -help`

  `Invalid command`

- `/./-> help system1`

  `Host System Directory`

- `/./-> help map1`

  `Management Service Processor Directory`

- `/./-> cd system1`

- `/./system1/-> help map1`

  `Management Service Processor Directory`

— `Help` for properties

Calling help for a property or any other option for which there is no help information returns an [Unsupported Command] or [Invalid command] message. For example:

```
/./system1/-> show
/./system1
Targets
   oemhp_sensors
   oemhp_frus
   log1
   led1
   console 1

Properties
   name=Hewlett-Packard
   enabledstate=enabled
   Verbs
      cd
      version
      exit
      show
      reset
      start
      stop
      help
   /./system1/-> help name
   Unsupported Command
   /./system1/-> help enabledstate
   Unsupported Command
   /./system1/-> help properties
   Unsupported Command
   /./system1/-> name -h
   Invalid command
   /./system1/->
```

- The `exit` command terminates the CLP session.

- The `cd` command sets the current default target. The context works similar to a directory path. The root context for the server and the starting point for a CLP system is /. (forward slash period). By changing the context, you can shorten commands.

  For example:

  — The `cd` command changes the directory.
  — The `cd ..` command moves up the tree one directory.
  — The `cd myfolder` command moves to the `myfolder` folder if `myfolder` is in the current directory.

- The `show` command displays values of a property or contents of a collection target. For example:

```
/./> show
   /.
   Targets
      system1
      map1
   Properties
   Verbs
      cd
      version
      exit
      show
      help
```

  The first line of information returned by the `show` command is the current context. In the example,

  `/.`

  is the current context. Following the context is a list of subtargets (Targets) and properties (Properties) applicable to the current context. The verbs section (Verbs) shows which commands are available in this context.

  The `show` command can also be specified with an explicit or implicit context and a specific property. An explicit context is `/map1/firmware` and is not dependent on the current context. An implicit context assumes that the context specified is a child of the current context. If the current context is /map1, then a `show firmware` command displays the /map1/firmware data. If a property is not specified, then all properties are shown.

- The `load` command moves a binary image from a URL to the map. The `load` command is used to take a binary image from a specific source location (specified as a URL) and place it at the specified target address. In a remote management processor implementation, the firmware downloads a full image file using TFTP from the specified location and programs flash with the image.

  In a remote management processor implementation, `/map1/firmware` is a valid target.

  The `load` command supports usage only with the following options.

  — `-source <location>` — This option must be specified.
  — `(h)elp` — This option appears on the command line. The command ignores all options and properties except `-output` (for terse or verbose output). These options are only valid for this command when the `-help` option is used.

    `source <value>` — This option specifies the target from which to transfer the binary image. The value specified must be a valid URL. The format is `//tftpserverip/path/filename`. This option is required in the command line when the `load` command is executed unless `-help` is used. The file must be an uncompressed firmware image file that you create using the DOS ROMPAQ utility found on the Lights-Out 100

Firmware Upgrade Diskette Utility available for download from the HP website (http://www.hp.com/servers/lights-out).

— Specify one of the following:
  - "-oemhpfiletype csr" for loading firmware
  - "-oemhpfiletype key" for loading a key
  - "-oemhpfiletype cer" for loading a certificate

Example:

```
/./map1/firmware/-> load -s //16.110.181.187/404.bin -oemhpfiletype csr
Firmware download is in progress.
BMC will be automatically reset once image is programmed and validated.
Checking Image 197120
Erasing Memory 2227924
Dnlding/Prgming 4194304
Time elapsed: 53 seconds.
Download Complete.
```

- The `reset` command causes a target to cycle from enabled to disabled and then to enabled again.
- The `set` command assigns a specific value to a property or group of properties. The standard syntax for the `set` command is

  ```
  set property=new value
  ```

  .

  The `set` command is used to change any changeable property. If the current directory does not contain the property you want to change, you must specify the target of the property before entering the property you want to change.
- The `start` command causes the system1 target to power on.
- The `stop` command causes the system1 target to power off.
- The `version` command queries the version of the CLP implementation or other CLP elements. For example:

```
/./map1/-> version
Version 1.00
/./map1/-> cd firmware
/./map1/firmware/-> version
Version 1.00
/./map1/firmware/-> show
   /./map1/firmware
   Targets
   Properties
      fwversion=0.59
   Verbs
      cd
      version
      exit
      show
      reset
      load
      help
/./map1/firmware/-> show fwversion
fwversion=0.59
/./map1/firmware/-> fwversion
Invalid command
/./map1/firmware/->
```

Specific commands

CLP syntax for specific commands is found in the sections that also describe the functionality through the Web interface.

DCMI 1.0 support

LO100 supports Data Center Manageability Interface (DCMI). DCMI enables you to simplify platform management implementations while enhancing robustness. Specifications are derived from Intelligent Platform Management Interface (IPMI) 2.0, which has been widely adopted by the computing industry for server management and system-health monitoring. For more information, see the Intel website (http://developer.intel.com/technology/product/DCMI/index.htm).

IPMI 2.0 support

LO100 supports the industry-standard IPMI 2.0. The IPMI specification defines standardized, abstracted interfaces that can be used for monitoring and control functions that are built in to the platform hardware.

In addition to supporting the mandatory commands for IPMI 2.0, the following additional IPMI 2.0 features are supported by LO100:

- Additional IPMI 2.0 commands
  - Get Channel Cipher Suites
  - Set/Get Channel Security Keys
  - Suspend/Resume Payload Encryption
- Payload types
  - IPMI Message
  - RMCP+ Open Session Request/Response
  - RAKP Message 1 / 2
  - RAKP Message 3 / 4
- Authentication algorithms
  - RAKP-none
  - RAKP-HMAC-SHA1
- Integrity algorithms
  - None
  - HMAC-SHA1-96
- Confidentiality algorithms
  - None
  - AES-CBC-128

Logging in to LO100

You can log in to the remote management processor through a web browser or through the CLP. If you are unsure of your DHCP IP address, refer to the "Configuring network access" section.

Logging in through a web browser

1. Browse to the IP address of the remote management processor to access the login screen.
2. Enter your user name and password. The default user name for the Administrator account is admin, and the default password is admin. The default user name for the Operator account is Operator, and the default password is Operator.

Logging in through the CLP

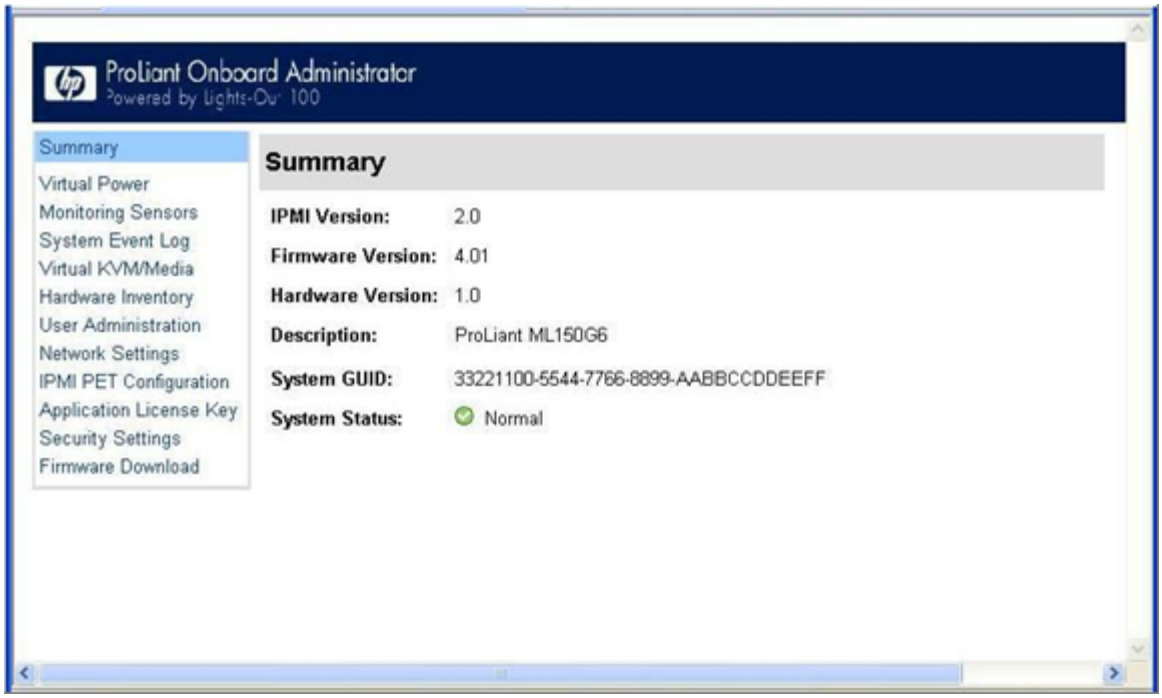
1. Establish a connection to the remote management processor by launching a telnet session or an SSH session.
2. Enter the user name at the login prompt. The default user name for the Administrator account is admin. The default user name for the Operator account is Operator.
3. Enter the password at the password prompt. The default password for the Administrator account is admin. The default password for the Operator account is Operator.
4. To exit the CLP and enter Console mode, enter the

   `exit`

   command at the command prompt.

Browser main menu options

Using a web browser, you can access all basic remote management capabilities of LO100. Not all of the features displayed and described in the guide are available on all systems. To verify which features are supported on your system, see "LO100 optional (licensed) features" for more information.



Option	Description
Summary	Accesses or returns you to the main menu navigation bar.
Virtual Power	Accesses system power and UID control options.
Monitoring Sensors	Lists all sensor information, including type, name, status, reading, and PEF settings.
System Event Log	Displays the system event log.
Virtual KVM/Media	Accesses virtual media or the remote graphic console.
Hardware Inventory	Displays system hardware information.
User Administration	Accesses the user configuration screen.
Network Settings	Accesses the network parameter settings screen.

Option	Description
IPMI PET Configuration	Accesses the PET destinations and alert policy table.
Application License Key	Displays the licensing screen.
Security Settings	Accesses LO100 security, personal certificate, and key installation options.
Firmware Download	Enables you to flash firmware through the web browser.

NOTE: The Virtual KVM / Media option is an advanced feature available through license upgrade and not available on all G6 systems unless the license is purchased. This link may appear as Virtual Media or not at all depending on your system implementation. To verify which features are supported on your system, see "LO100 optional (licensed) features" for more information.

Controlling server power remotely

LO100 enables you to remotely operate the power button of a host server using a web browser or the CLP. LO100 virtual power support enables you to power on, power off, and power cycle the host server. This virtual power support operates independently of the state of the operating system.

Controlling server power from a browser

The Virtual Power screen displays current power status, how long the server has been powered on, and the reason for the last server restart. To display the Virtual Power screen, on the main menu navigation bar, click **Virtual Power.**



To modify Chassis Actions, select a Power Control Option in the Chassis Actions section, and then click **Apply.**

To identify the server in the rack and illuminate the UID (the LED on the front panel of the server), from the UID list, select the length of time for the UID to illuminate, and then click **Identify.**

NOTE: The UID is not available on all LO100 servers. For more information, see your server user guide.

A restore policy controls how the system responds when power is connected to the server. To set a restore policy:

1. Select the Power Restore Policy by choosing one of the following options:
   - Always power up—Powers on the server immediately after power is supplied.
   - Restore to powered state prior to power loss—Powers on the system if the system was in the powered on state before a loss of power.
   - Power pushbutton or command required to power on system—Causes the server to wait for external action before powering on the system.
2. Click **Set.**

   The power restore policy becomes becomes active after a successful BIOS post.

Controlling server power through the CLP

1. Log in to LO100 CLP as described in the "Logging in to LO100" section.
2. Change to the system1 target by entering `cd system1.`
3. To power on the server, enter `start /system1`. For example:

   ```
   /./system1/> start /system1
   System1 started.
   ```
4. To power off the server, enter `stop /system1`. For example:

   ```
   /./system1/> stop /system1
   System1 stopped.
   ```

   The `-force` option can also be used with the `stop` command. This option forces the implementation to stop the target, ignoring any policy that might cause the implementation to normally not execute the command. In remote management processor implementation, this process is equivalent to a hard power down.
5. To reset the server, enter `reset /system1`. For example:

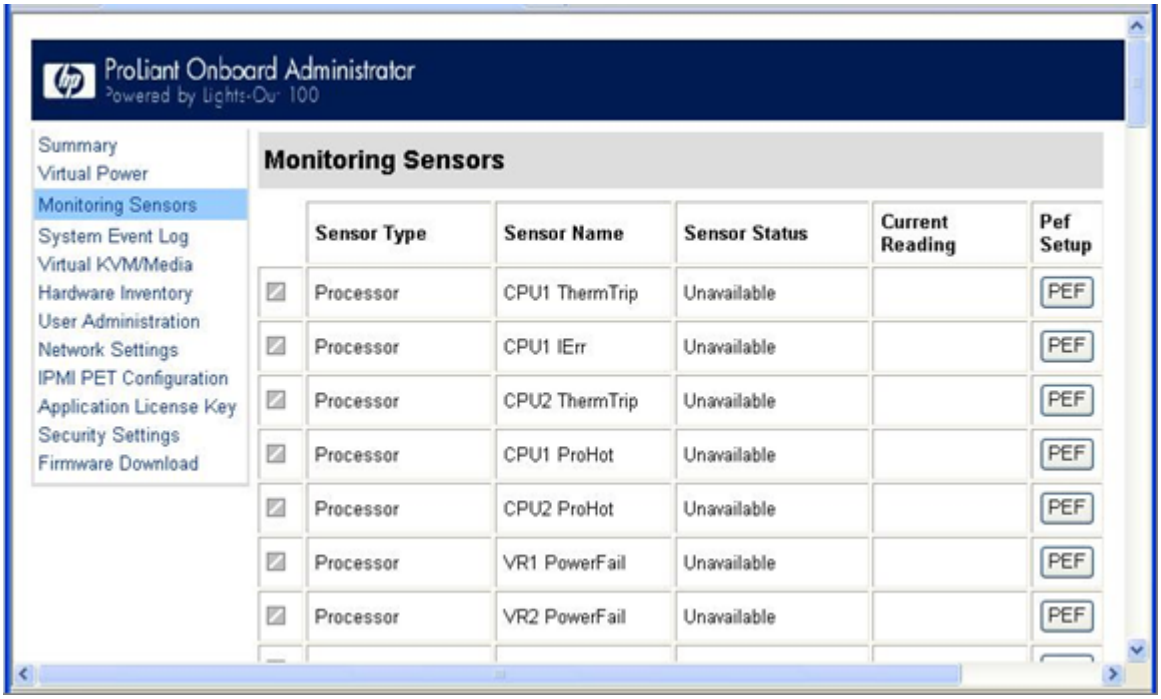
   ```
   /./system1/> reset
   System1 reset.
   ```

Monitoring sensors

LO100 provides operating system-independent remote monitoring of the current status of major sensors of a target server including system temperature, fans, and voltage. You can view the data for this feature on the Monitoring Sensors Page through a web browser or through the BIOS Setup Utility.

Viewing sensor data from a web browser

The Monitoring Sensors screen displays a snapshot of the temperature, fans, and voltage sensor data, including sensor type, name, status, and current reading. To access this page from a web browser, on the main menu navigation bar, click **Monitoring Sensor.**



To update the display, click the **Refresh** button. To view or add a PEF action, click **PEF.** For more information, see "Platform Event Filtering configuration."

Viewing sensor data from the BIOS Setup Utility

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
4. Choose one of these options based on server model:
   - ML110 G6 and DL120 G6 servers:
     a. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
     b. Press the down arrow (↓) key to scroll to Realtime Sensor Data. Press the **Enter** key.
   - On ML150 G6 servers, scroll to Hardware Health Information by pressing the down arrow (↓) key. Press the **Enter** key.
   - On DL160 G6, DL160se G6, DL180 G6, and SL160z G6 servers, and DL165 and SL165z G7 servers, scroll to the Hardware Health Information menu by pressing the down arrow (↓) key. Press the **Enter** key.
   - On DL170h G6, SL170z G6, SL170s G6, and SL2x170z G6 servers, scroll to the Hardware Health Information menu by pressing the down arrow (↓) key, and then scroll to the Ambient Sensor Health Information menu. Press the **Enter** key.

   The message `Loading data. Please wait` appears. After this message disappears, the Temperature and Voltage sensor data appears. This data is real-time data and is updated on a periodic basis.

Platform event filtering configuration

The PEF Configuration screen enables you to configure LO100 to take selected actions on received or internally generated event messages. These actions include powering down the system, resetting the system, and triggering the generation of an alert.

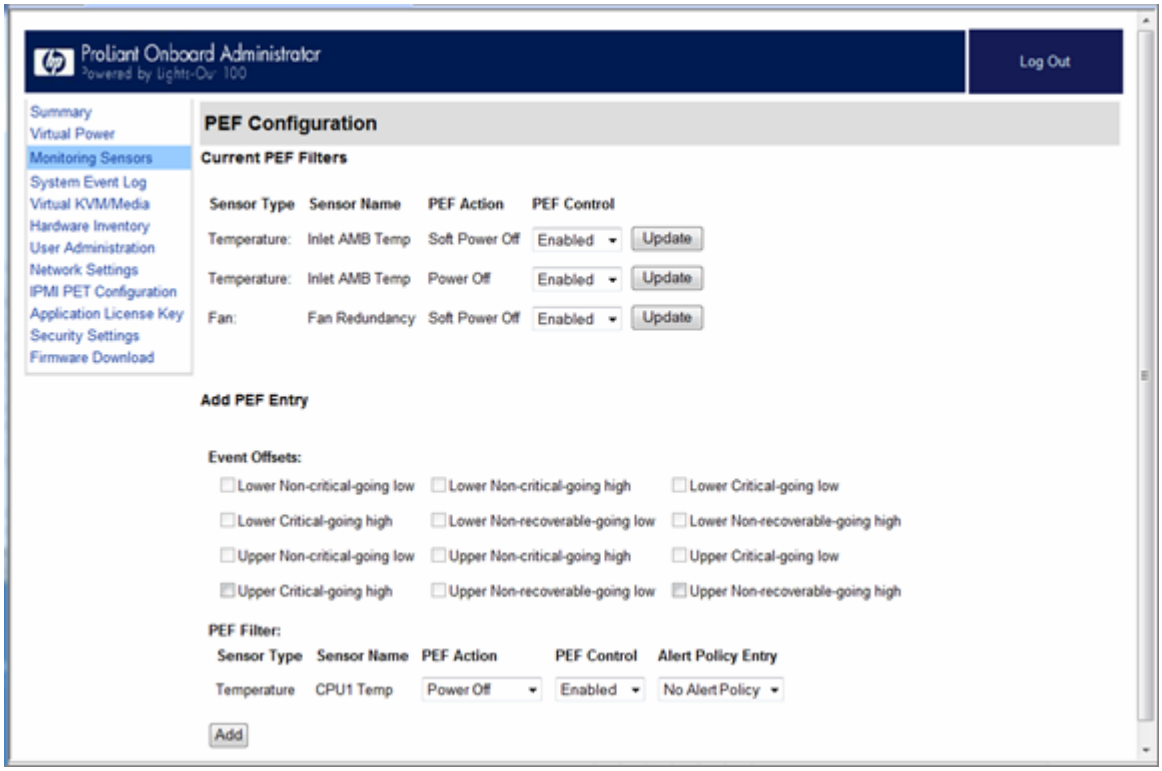
To enable PEF functionality you must issue the following commands in the CLP:

```
cd map1
oemhp i 20 10 D0 18 00 12 01 03 D2
oemhp i 20 10 D0 18 00 12 02 3F 95
```

To configure a PEF for a particular sensor, click the **PEF** button to the far right of that sensor on the Monitoring Sensors screen. The PEF button adjacent to each sensor opens a PEF Configuration page for that sensor.

The PEF Configuration screen contains two sections: Current PEF Entries and Add PEF Entry. The Current PEF Entries section includes Sensor Type, Sensor Name, PEF Action, and PEF Control information. The Add PEF Entry section enables you set an action.

Initially, there are no entries are in the Current PEF Entries section because no PEFs are defined. When PEF entries are defined, the PEF Control field is active and enables you to set the individual entries to enabled, disabled, or deleted.



To configure an action (PEF entry), select the desired Event Offsets, select the desired PEF Action settings, and then click **Add.**

- Event Offsets—Are trip points (movements across thresholds) that define what type of sensor event triggers an action. The information in the Events Offsets section varies with the type of sensor. Not all options are available for all sensors. You can select any of the available options.
- PEF Action—Displays the same information for all sensors:
  - Sensor Type—Displays the type of sensor selected.
  - Sensor Name—Displays the name of the sensor.
  - PEF Action—Enables you to select from Power Off, Power Cycle, Hard Reset, and Send Alert (requires a systems management console supporting IPMI 1.5 or later).
  - PEF Control—Enables or disables the sensor.
  - Alert Policy (list adjacent to the Add button)—Enables you to select an alert policy (if defined). Alert policies are defined on the PET Configuration screen. For information, see "Platform event trap configuration."

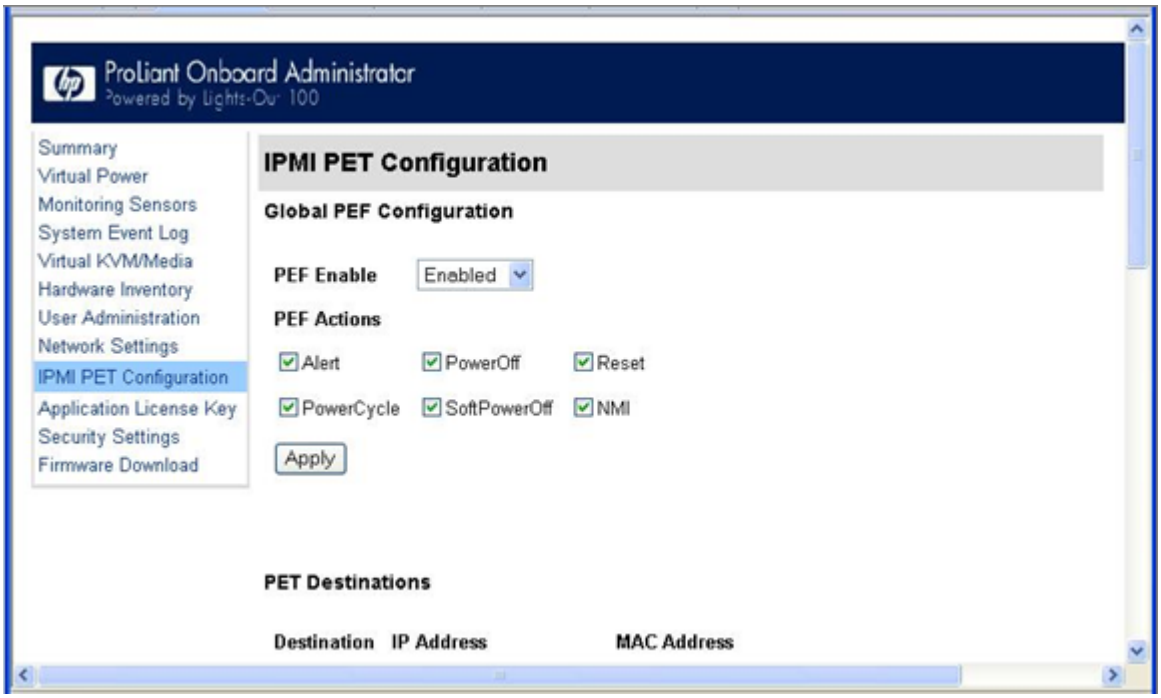
    If alert policies are not defined (default), the Alert Policy list displays No Alert Policy. The Alert Policy list populates after alert policies are defined and configured. After

configuring your alert policies, you can select from the defined alert policies for this sensor and PEF.

— Add—Adds the new entry to the PEF Current Entry table at the top of the page.

Platform event trap configuration

The IPMI PEF Configuration screen enables you to set an alarm or specified condition originating on the server to alert an IPMI 2.0-supported systems management console. To display the IPMI PEF Configuration screen, on the main menu navigation bar, click **IPMI PEF Configuration.**



The Global PEF Enable section enables you to set a global PEF action. To create a global PEF action, select **Enabled** in the PEF Enable box, select the PEF action, and then click **Apply.**

The PET Destinations section indicates where LO100 sends the PET (if configured.) This section has up to eight entries specifying IP and MAC addresses. In the PET Destinations section, enter either an IP address or a MAC address and then click **Apply.** If both the MAC and an IP address are entered, the IP address is used.

To set a policy:

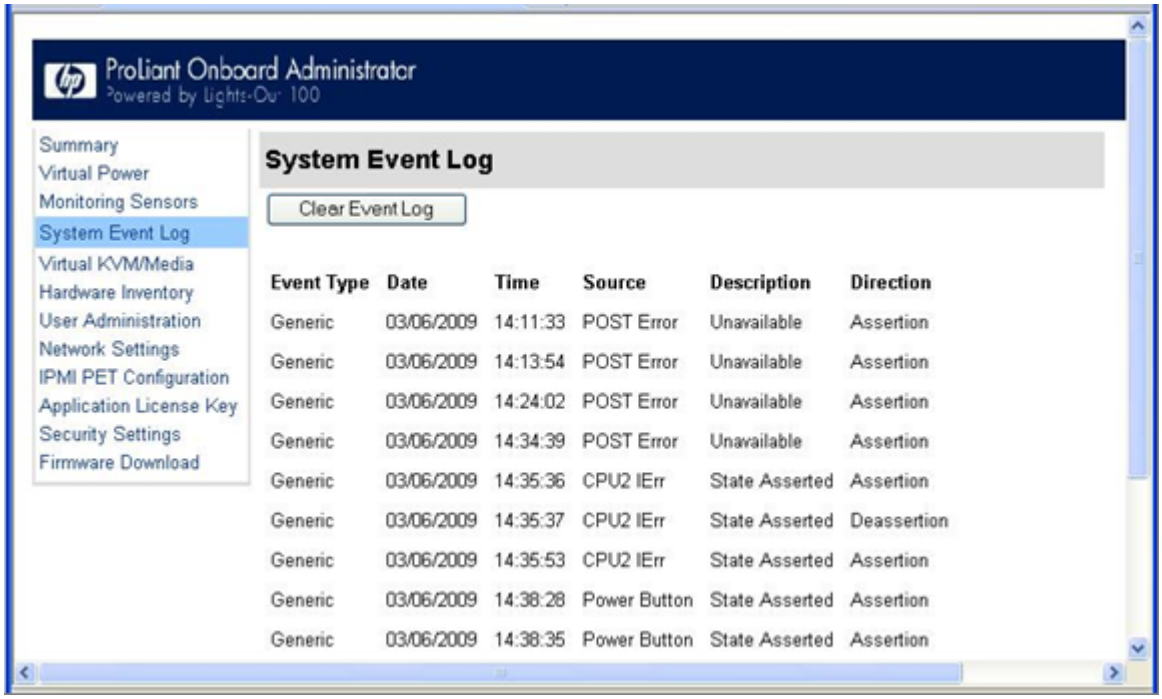
1. Select the Policy Enable state and then enter the Policy Number and Destination Selector information.
   - Policy Enable—Enables you to selectively enable and disable trap forwarding.
   - Policy Number—Enables you to select a policy that will be used in PEF configuration.
   - Destination Selector—Specifies where to send the PET trap from the destinations defined in the PET Destinations section.
2. Click **Apply.**

Using the system event log

LO100 captures and stores the IPMI event log for access through a browser, CLP, BIOS Setup Utility, and RBSU even when the server is not operational. The system event log displays a short description of each system event. Recorded events include abnormal temperature, fan events, system resets, and system power loss.

Accessing the system event log from a web browser

The System Event Log screen displays a brief description of the event, including event type, date, time, source, description, and direction.



To access the System Event Log from a web browser, on the main menu navigation bar, click **System Event Log.** To clear the system event log, click **Clear Event Log.**

Accessing the system event log from the CLP

1. Log in to the CLP as described in the "Logging in to LO100" section.
2. Enter `cd /./system1/log1`
3. Enter `show` to display the total number of system event records.
4. Enter `show record<n>` to display the details of a specific record. For example:

```
/./map1/log1/-> show record1
   record
   Targets
Properties
   number=1
   date=05/07/2008
   time=16:42:52
   sensordescription=Identify
   eventdescription=State Asserted
   eventdirection=Assertion
Verbs
   cd
   version
   exit
   show
   reset
   oemhp
   help
```

Accessing the system event log from the BIOS Setup Utility

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.

3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
4. Choose one of these options based on server model:
   - On ML110 G6 and DL120 G6 servers:
     a. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
     b. Press the down arrow (↓) key to scroll to System Event Log. Press the **Enter** key.
   - On ML150 G6 servers, scroll to the bottom of the IPMI page.
   - On DL160 G6, DL160se G6, DL170h G6, DL180 G6, SL160z G6, SL170z G6, SL170s G6,and SL2x170z G6 servers, and DL165 and SL165z G7 servers:
     a. Scroll to the System Event Log Configuration menu by pressing the down arrow (↓) key. Press the **Enter** key.
     b. Press the down arrow (↓) key to scroll to either Clear System Event Log or View System Event Log, as appropriate.
5. Press the **Enter** key to view the highlighted setup item.
6. Press the **Esc** key to return to the previous screen, or press the **F10** key to save the changes and exit Setup.

Using Virtual KVM

The Virtual KVM feature of LO100 is a remote graphic console that turns a supported browser into a virtual desktop and provides full control over the display, keyboard, and mouse of the host server. The operating system-independent console supports graphic modes that display remote host server activities, including shutdown and startup operations.

Virtual KVM is available by purchasing the Lights-Out 100i Advanced Pack. For more information, see "LO100 optional (licensed) features."

When connecting to the Virtual KVM applet for the first time, the applet reports an error. To clear the error and connect to the Virtual KVM applet, close your browser session, and then reconnect to the Virtual KVM applet.

The Virtual KVM applet is not compatible with standard VNC clients and does not implement standard VNC protocols. You must use the supplied Java™ applet to connect to the server. The Virtual KVM applet cannot pass the F10 key sequence to the target system. To work around this issue, use the virtual keyboard on the remote server to transmit the F10 key.

The remote graphic console requires JVM version 1.4.2 or later in the client system. To download the recommended JVM for your system configuration, refer to the HP web site

To start the LO100 remote graphic console using a web browser:

1. Log in to LO100.
2. Click **Virtual KVM / Media.** The LO100 remote graphic console window appears.



NOTE: The Virtual KVM / Media option is an advanced feature available through license upgrade and not available on all G6 systems unless the license is purchased. This link may appear as Virtual Media or not at all depending on your system implementation. To verify which features are supported on your system, see "LO100 optional (licensed) features" for more information.

3. To take full control of the system, click **OK,** or to access the system in a view-only mode, click **Cancel.**

Before using the mouse in LO100 remote graphic console, HP recommends synchronizing your local mouse pointer and the remote mouse pointer. For more information, see "Mouse synchronization."

Using the remote graphic console

The Remote KVM/Media Viewer displays a virtual desktop and provides full control over the display, keyboard, and mouse of the host server. There are three different menus in the remote graphic console menu bar: Control, Preferences, and Help.

- Control—Enables you to access virtual media devices and the virtual keyboard, refresh the screen, and exit the client.
- Preferences—Enables you to set mouse, keyboard, and logging options.
- Help—Displays an About box, which specifies the LO100 remote graphic console version, build date, and time.

The Control menu of the remote graphic console has several different options.

- Virtual Media—Displays the Virtual Media Devices page. The Virtual Media Devices page displays all accessible media drives of the storage server. Supported devices are CD-ROM, DVD-ROM, floppy disk, and mass storage devices. For more information, see "Using Virtual Media."
- Virtual Keyboard—Opens a virtual keyboard enabling you to change the language of the virtual keyboard. To change keyboard settings, see "Remote graphic console settings"

  The Lock button on the Virtual Keyboard is added to each language. If you click the Lock button, special keys that you press, such as Shift, Alt, Ctrl, context and Windows remain in a pressed status. To release the special keys, click the **Lock** button and then click the pressed special keys.



NOTE: When entering any ESC key sequences, extra characters might be buffered, causing the remote side to receive function-key presses incorrectly. To avoid this issue and perform function key or alternate key sequences, press and hold the **ESC** key, release it, and then press the other key sequence.

- Turn local monitor on—Powers on the local monitor.
- Turn local monitor off—Powers down the local monitor.

  When the Turn local monitor off setting is enabled, the local monitor (if connected) appears black (blank/off) when Virtual KVM is invoked. This is a security feature. The local monitor returns to normal operation after closing Virtual KVM.

  The Virtual KVM applet is not compatible with standard VNC clients and does not implement standard VNC protocols. You must use the supplied Java™ applet to connect to the server. The Virtual KVM applet cannot pass the F10 key sequence to the target system. To work around this issue, use the virtual keyboard on the remote server to transmit the F10 key.
- Refresh Screen—Updates the information on the screen.
- Take Full Control—Enables you to take control of the remote console if you are currently in view-only mode. Only one remote console user can control the remote console at a time.
- Disconnect Session—Disconnects the selected user session.
- Relinquish Full Control—Releases control of the session and remains in a view-only status.
- Exit—Closes the remote session.

NOTE: The Keyboard, Refresh Screen, Take Full Control, Disconnect Session, and Relinquish Full Control menu options are an advanced feature available with full Virtual KVM access only.

Remote graphic console settings

To change the mouse, keyboard, and logging settings, select **Preferences.**

- The Mouse tab enables you to set the Mouse mode. To display the Mouse Mode list, select **Mouse,** which has the following options:
  - Hide Mode (Relative) causes the LO100 remote graphic console to change to Relative mode.

    Relative mouse mode hides the local mouse cursor. Use Hide Mode Relative if you are running a DOS-based program and the mouse is not tracking correctly.

    When using Hide Mode, the local mouse is inaccessible. To access the local mouse (normal mode), press **Ctrl+Alt+0.**
  - Absolute Mode causes the LO100 remote graphic console to send raw *x* and *y* coordinates to the server.
  - Relative Mode sends the LO100 remote graphic console relative mouse position coordinates (+/- previous mouse pointer position) to the server. This mode is the default for Linux and Windows.
- The Keyboard tab enables you to set the language of the virtual keyboard and the connection type. English is the default language. You can change the language of the virtual keyboard by selecting one of the 12 languages.

  The remote side server and local side server (the LO100 remote graphic console) must use the same language for the virtual keyboard to function properly.

  LO100 supports the following connection types:
  - VNC (port 5900) supports Virtual KVM and LO100 Virtual Media. Port 5900 is the default setting.
  - Unsecured keyboard (port 5902) supports the keyboard. Port 5902 supports video, mouse, and LO100 Virtual Media.
  - Secure keyboard (port 5904) encrypts all keyboard data sent through this port. Port 5904 is a unsecured port that supports video, mouse, and LO100 Virtual Media.
- The Logging tab enables you to view log messages in a Java™ console. The Logging tab also provides a timeout variable to inform you of how long you can stay in KVM.

  Global Logging is disabled by default. If you enable this option, you can view log messages in a Java™ console.

  Do not run the console longer than 2 hours. The console uses all available memory and might cause the LO100 remote graphic console and the user web browser to crash. Periodically clear the event log to prevent a slow connection or possible crash.

  To record all log messages to the console from the Logging list, select **Console.** To check log messages in the Java™ console window, from the list on the Tools menu of Internet Explorer menu bar, select **Sun Java Console.**

  To record all log messages to a file, select **Log File** from the Logging list, enabling the Console Log File textbox. To select a file in which log messages will be stored, click the **Browse** button, or enter the fully qualified file name of the selected file in the textbox. To send log messages to both a file of your choice and to the Java™ console, select **Consoleand Log File.**

Mouse synchronization

To synchronize the local mouse pointer and the server mouse pointer, bring the local mouse to the top left corner to attract the server mouse pointer to the top left corner. Both pointers become synchronized when they overlap as one pointer.

For mouse synchronization to work correctly, you must change the Enhance Mouse pointer and Hardware Acceleration options on the remote machine (server side) using the LO100 remote graphic console.

For Windows operating systems, perform the following steps:

To change the Enhance Mouse pointer option:

1. Select **Start>Control Panel.**
2. Double-click **Mouse.** The Mouse Properties window appears.
3. Select **Pointer Options**.
4. In the Pointer Options window:
   a. Set the Pointer speed bar in the middle.
   b. Be sure the Enhance pointer precision option is not selected.

To change the Hardware Acceleration option:

1. Right-click the desktop screen
2. Select **Properties.** The Display Properties window appears.
3. Click **Settings>Advanced.** The video card and monitor properties window appears.
4. Click **Troubleshoot.**
5. Set hardware acceleration to **None** to disable cursor and bitmap accelerations (one scale or option below Full).
6. Click **Apply.**
7. Click **OK** to exit the Display Properties window.

For Linux operating systems, perform the following steps:

- For SLES 9:
  1. Determine which mouse device is the remote console mouse using the `xsetpointer -l` command to list all mouse devices.
  2. Determine which mouse to modify by cross-referencing the output of xsetpointer with the X configuration (either`/etc/X11/XF86Config` or `/etc/X11/xorg.conf`.)
  3. Select the remote console mouse as the mouse to modify. For example:

     ```
     xsetpointer Mouse[2]
     ```

  4. Set the acceleration parameters. For example:

     ```
     xset m 1 1
     ```

- For Red Hat Enterprise Linux, set the acceleration parameters using:

  ```
  xset m 1 1
  ```

System buttons

On the virtual keyboard, there are eight different system buttons: LCtrl, LWin, LAlt, RAlt, RWin, RCtrl, Context, and [Lock]. These buttons can be used as virtual keys and are similar to the keys the physical keyboard of your local machine.

For example, when you press the **Ctrl+Alt+Del** keys on the physical keyboard, the Task Manager of your local machine appears in addition to the task manager on the server, or the key combination unlocks the server for login. To display the Task Manager of the remote server by pressing similar virtual keys, on the LO 100 remote graphic console window, click LCtrl click LAlt, and then press the Del key on your physical keyboard. Using this key combination displays

the LO100 remote graphic console Task Manager. You can use any combination of virtual and physical Alt, Ctrl, and Del keys.

- Lock and special buttons, when pressed, remain in a pressed state until released. To release special buttons, click **[Lock],** and press the system buttons.
- Selecting or pairing LCtrl and RCtrl, LAlt and RAlt, LWin and RWin function as they would on an English language keyboard. However, they might function differently on keyboards of other languages.
- Clicking **Context** is equivalent to right-clicking the LO100 remote graphic console window.

Using Virtual Media

LO100 Virtual Media enables you to add, browse, remove, and share media devices and refresh the displayed virtual media devices list. LO100 Virtual Media is available by purchasing the Lights-Out 100i Advanced Pack. For more information, see "LO100 optional (licensed) features."

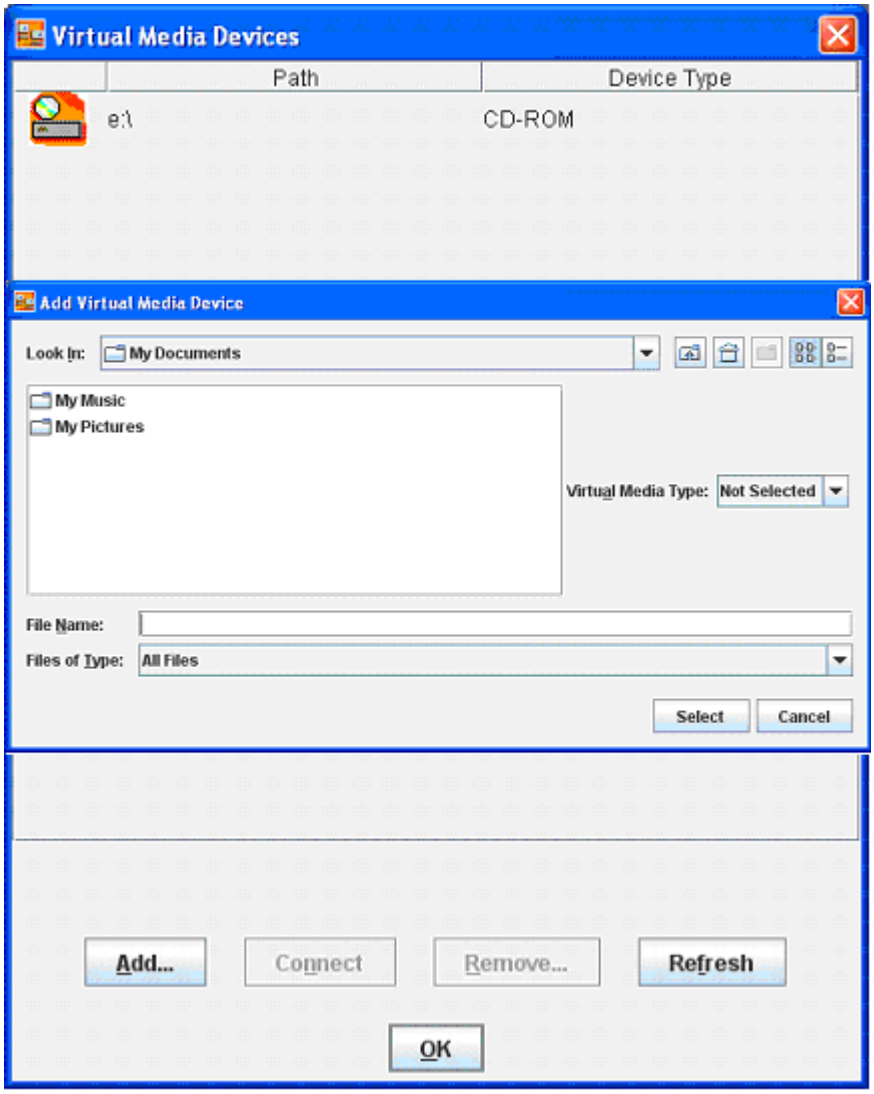
To access LO100 Virtual Media:

1. Click **Virtual KVM / Media.** The Virtual KVM screen appears.
2. On the Virtual KVM menu, select **Virtual Media** from the Control menu. The Virtual Media window appears and has the following options:
   - Clicking **Add** adds a new virtual media device to the storage devices list. See "Adding a virtual media device" for more information.
   - Clicking **Connect** shares the selected device. Only one device can be shared at one time.
   - Selecting a device and clicking **Remove** removes devices from the virtual media devices list.
   - Clicking **Refresh** rescans and displays the current devices on your machine.

A CD-ROM, DVD-ROM, or ISO image mounted through the Virtual KVM or Virtual Media applet functions and appears (in boot order) the same as a locally mounted media device.

Adding a virtual media device

The LO100 virtual media option provides you with a virtual media drive, which can direct a remote host server to boot and use standard media from anywhere on the network. Virtual media devices are available while the host system boots.



To add a new virtual media device, click **Add** on the Virtual Media page. The Add Virtual Media Devices window appears. This window has the following options:

- The Look In list enables you to change your directory or drive.
- The Virtual Media Type list enables you to specify the file type that you want to share. You must declare a Virtual Media Type before LO100 recognizes they type of device it is sharing.
- The File Name textbox is the shared name of the image.
- Select a value from the Files of Type list to select the files you want to share.

Shared virtual media devices

You can share a virtual media device from the Storage Devices window. Only one device may be shared at a time.

To share a virtual media device, do the following:

1. On the Virtual KVM menu, select **Virtual Media** from the Control menu. The Virtual Media window appears.
2. If the device you want to add is not in the list, click **Refresh.**
3. To add a device, see "Adding a virtual media device."
4. Select the device, and then click **Connect.** A message box appears, indicating either the device has been successfully connected or a problem has occurred.
5. Click **OK** to close the Virtual Media window.

To remove a shared virtual media device, do the following:

1. Before removing a shared device, verify the device is safe to remove. If necessary, perform any required steps necessary to ensure the safe removal of removable media devices on the server.
2. On the Virtual KVM menu, select **Virtual Media** from the Control menu. The Virtual Media window appears.
3. Select the device you want to remove and click **Remove.** A dialog box appears, indicating that the device has been successfully disconnected.
4. Click **OK** to close the Virtual Media window.

Accessing the remote console through Telnet

You can access the remote console through either the BIOS console text-redirection functionality or a Windows Server 2003 text-based console. Only one Remote Console window can be open at a time.

To start a remote console session, press the **Esc+Q** keys. To end a remote console session and return to the CLP press the **Esc+(** keys.

NOTE: When entering any ESC key sequences, extra characters might be buffered, causing the remote side to receive function key presses incorrectly. To avoid this issue and perform function key or alternate key sequences, press and hold the **ESC** key, release it, and then press the other key sequence.

To change the timeout settings for telnet and for the remote console use Linux raw IPMI commands or an

```
oemhp
```

command through telnet. The following examples disable timeout:

- Linux IPMI tool Raw command example:

  ```
  ipmitool raw 0x0c 0x01 0x02 0xf6 0x00 0x00
  ```

- Disabling the security timeout using telnet example:

  ```
  oemhp i 20 30 b0 18 00 01 02 f6 00 00 ef
  ```

  The expected response is:

  ```
  18 34 B4 20 00 01 00 DF  .4......
  ```

NOTE: These commands only work in firmware versions 3.05 or later.

Redirecting BIOS console text through Telnet

LO100 BIOS console text redirection enables you to view the entire boot process remotely and make changes in the BIOS Setup Utility from a remote computer. This utility helps you troubleshoot and manage servers remotely.

To configure the BIOS Setup Utility on the target system:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Choose one of these options based on your server model:
   - On ML110 G6 and DL120 G6 servers:
     a. Press the down arrow (↓) key to scroll down to the Console Redirection option, and press the **Enter** key.
     b. Set BIOS Server console to **Enabled.**
     — Baud Rate—9600 (this is the only setting that can be changed)
   - On ML150 G6 servers:

a. Press the down arrow (↓) key to scroll down to the Console Redirection option, and press the **Enter** key.

b. Verify the following settings:

— Console Redirection—Enabled

— Serial Port Mode—9600 8,n,1

— Terminal Type—VT100+

— Flow Control—None

— Redirection after BIOS POST—On

- On DL160 G6, DL160se G6, DL170h G6, DL180 G6, SL160z G6, SL170z G6, SL170s G6, and SL2x170z G6 servers and DL165 and SL165z G7 servers:

  a. Press the down arrow (↓) key to scroll down to the Remote Access Configuration option, and then press the **Enter** key.

  b. Verify the following settings:

  — Remote Access—Enabled

  — EMS support(SPCR)—Enabled

  — Base Address—IRQ4/3F8

  — Serial Port Mode—9600 8,n,1

  — Flow Control—None

  — Terminal Type—VT100

  — Redirection after BIOS POST—Enabled

4. Press the **Esc** key to return to the previous screen.
5. Scroll to the I/O Device Configuration option, and press the **Enter** key.
6. Verify that Serial Port is set to Enabled.
7. Follow the instructions in the "Network settings" section to set or obtain a valid IP address.
8. Press the **F10** key to save and exit.

After completing the console redirection process, you can view the boot process remotely from a client PC through an established Telnet session to the IP address of LO100. See your operating system documentation for instructions on establishing Telnet sessions.

To redirect the console to the Telnet session and view the boot process, press the **Esc+Q** keys in the Telnet session during server boot. If you reset the server using the Telnet connection, and press the **Esc+Q** keys, the boot process might not appear immediately. The boot process appears after the server resets. To exit the console redirection and return to CLP, end this session by pressing the **Esc+(** keys.



NOTE: If you encounter problems logging in to the remote console, be aware that some telnet programs might require you to enable their `send line feed at end of line` option. If the remote console does not respond to the Enter key, try setting this option in your telnet program.

NOTE: You must follow the instructions in the "Network settings" section to configure the network access properly.

Redirecting a Linux console

In the remote console and servers with the Linux operating system, you can enable a remote login on ttyS0 by making the following changes to the BIOS Setup Utility and boot documents.

NOTE: The actual steps will vary depending on your version of Linux.

1. Using the BIOS Setup Utility, verify your system configuration by choosing one of these options based on your server model:
   - On ML110 G6 and DL120 G6 servers, verify the following settings:

     Console Redirection

     — BIOS Serial console—Enabled
     — Baud Rate-9600

     I/O Device Configuration

     — Embedded Serial Port Mode—BMC
     — Embedded Serial Port—Enabled
   - On ML150 G6 servers, verify the following settings:

     Console Redirection

     — BIOS Serial console—Enabled
     — EMC Support (SPCR)—Enabled
     — Serial Port Mode—9600 8,n,1
     — Console Type—VT100
     — Continue C.R. after POST—On

     I/O Device Configuration

     — Serial Port A—Enabled
     — Base I/O address—3F8
     — Interrupt—IRQ 4
   - On DL160 G6, DL160se G6, DL170h G6, DL180 G6, SL160z G6, SL170z G6, and SL2x170z G6 servers, and SL165z G7 servers, verify the following settings:

     Remote Access Configuration

     — Remote Access—Enabled
     — EMS support(SPCR)—Enabled
     — Terminal Type—VT100
     — Flow Control—None
     — Redirection after BIOS POST—Always

     SuperIO Configuration

     — Serial Port Address—3F8
     — Serial Port IRQ—IRQ 4
2. In the `/boot/grub/menu.lst` file, append the following to the kernel startup line:

   ```
   console=ttyS0 115200
   ```

   Comment out the line

   ```
   GRAPHICAL DISPLAY LINE
   # splashimage=(hd0,0)/grub/splash.xpm.gz
   ```
3. Add an entry to allow serial console login in `/etc/inittab`. For example:

   ```
   S0:12345:respawn:/sbin/agetty -L 115200 ttyS0 vt102
   ```
4. In `/etc/securetty` enable root access to ttyS0 by adding `ttyS0`.
5. In `/etc/sysconfig/kudzu`, set kudzu to not perform serial port probing during boot. For example:

```
SAFE=yes
```

6. After modifying and saving the previous files, reboot the server. You can now log in to the operating system through remote console.

After POST, in the remote console, the server prompts you with a login. Enter a valid login and use the server as you normally would. Use the ESC+Q keys to start remote console through the telnet and the ESC+(keys to exit the remote console in telnet.

Microsoft Windows EMS management

Windows Server 2003 provides text-based console access. You can connect a notebook to LO100 to perform basic management tasks on the target system. The Windows EMS Console, if enabled, displays the processes that are running and enables administrators to halt processes when video, device drivers, or other operating system features have prevented normal operation and normal corrective actions.

To enable Windows EMS management on the target system:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Navigate to the **Advanced>Console Redirection** menu.
3. Choose one of these options based on your server model:
   - On ML110 G6 and DL120 G6 servers:
     a. Press the down arrow (↓) key to scroll down to the Console Redirection option, and then press the **Enter** key.
     b. Verify the following settings:
     — Baud Serial Console Port—Enabled
     — Baud Rate—9600
   - On ML150 G6 servers:
     a. Press the down arrow (↓) key to scroll down to the Remote Access Configuration option, and then press the **Enter** key.
     b. Verify the following settings:
     — Remote Access—Enabled
     — EMS support (SPCR)—Enabled
     — Serial Port Mode—9600 8,n,1
     — Flow Control—None
     — Console Type—VT100
     — Continue C.R. after POST—Always
   - On DL160 G6, DL160se G6, DL170h G6, DL180 G6, SL160z G6, SL170z G6, SL170s G6,SL2x170z G6 servers, and DL165 and SL165z G7 servers:
     a. Press the down arrow (↓) key to scroll down to the Remote Access Configuration option, and then press the **Enter** key.
     b. Verify the following settings:
     — Remote Access—Enabled
     — EMS support(SPCR)—Enabled
     — Serial Port Mode—9600 8,n,1
     — Terminal Type—VT100
     — Flow Control—None
     — Redirection after BIOS POST—Always
4. Press the **Esc** key to return to the previous screen, or press the **F10** key to save the changes and exit setup.

After enabling Windows EMS management, you can view the Windows EMS management console remotely from a client PC through an established Telnet session to the IP address of the

target server by pressing the Esc+Q keys. You can end an EMS session by pressing the Esc+(keys. See your operating system documentation for instructions on establishing Telnet sessions.

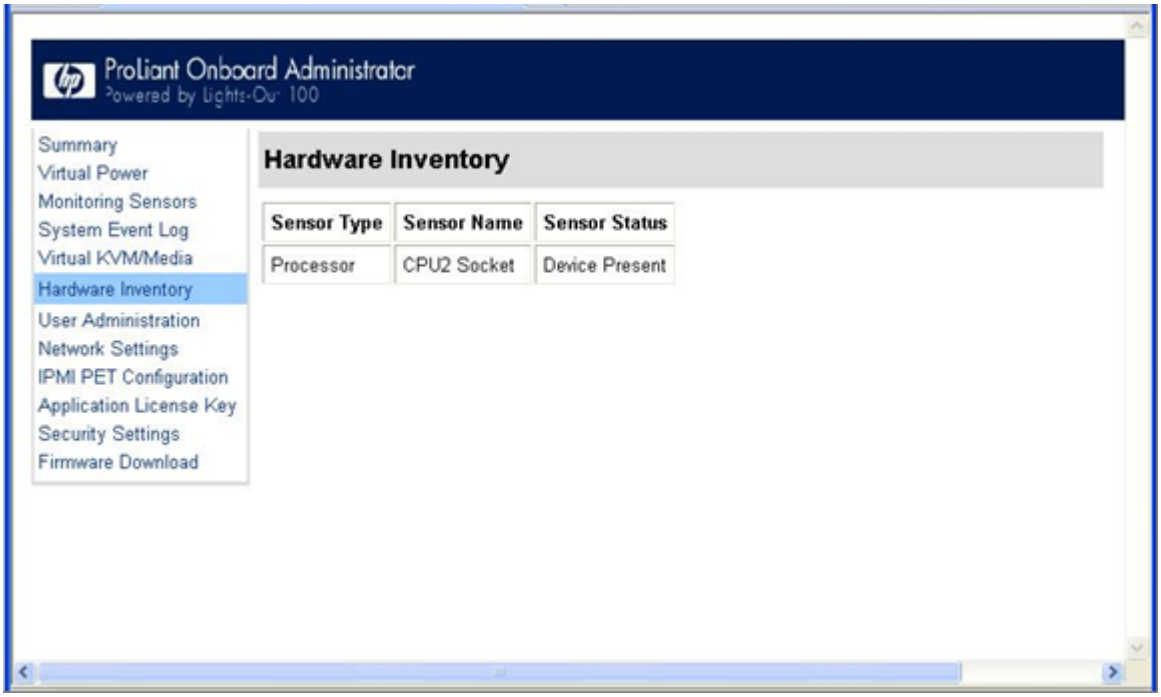
NOTE: If you encounter problems logging in to the remote console, be aware that some telnet programs might require you to enable their

```
send line feed at end of line
```

option. If the remote console does not respond to the Enter key, try setting this option in your telnet program.

Hardware Inventory page

The Hardware Inventory page enables you to remotely identify the presence of processors on a target server. To access this page from a web browser on the main menu navigation bar, click **Hardware Inventory.**



User administration

The User Administration option on the main menu navigation bar enables you (if authorized) to edit the user name and password for existing users. You cannot create a new user. The user password is stored in nonvolatile memory and can be changed through a web browser (see "Changing user settings through a web browser") or through the CLP.

When using CLP, if you do not have the correct privileges a warning message appears. If you receive a warning message, you must end the telnet connection and re-establish a connection. There are no restrictions when logged in as either OEM or administrator. User and operator accounts have the following access.

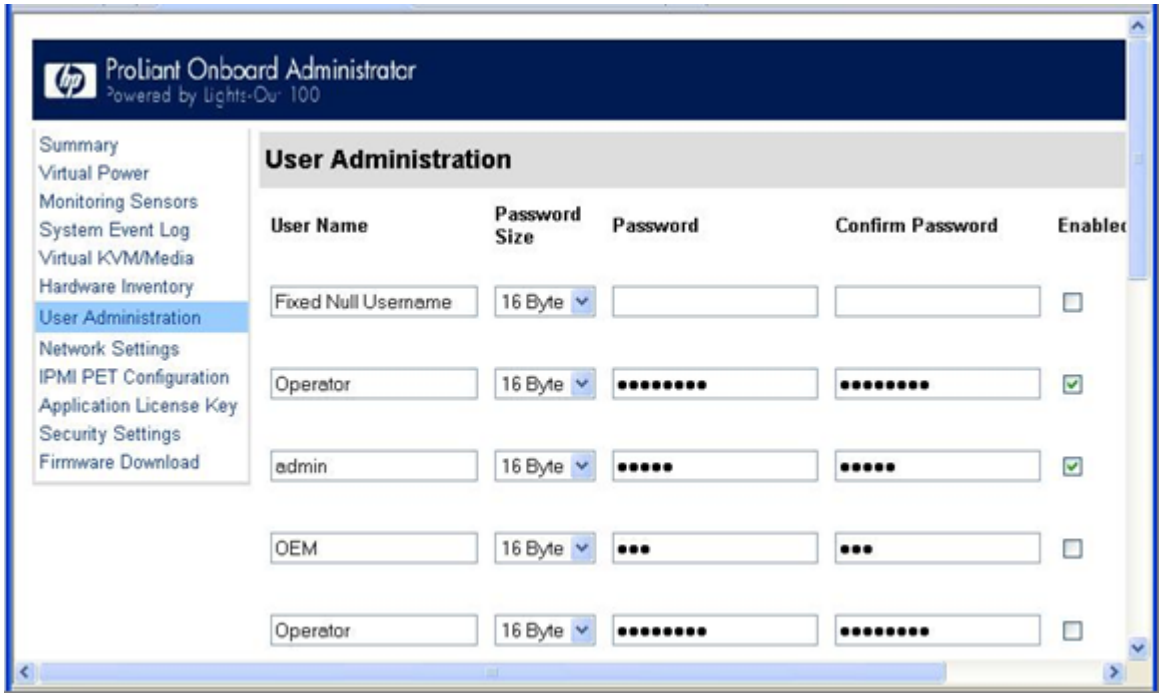
Option	User	Operator
Hardware Inventory	Yes	Yes
Virtual Power	No	Yes
Monitoring Sensors	View only	Yes
System Event Log	Yes	Yes

Option	User	Operator
Network Settings	No	No
PET Configuration	No	No
User Configuration	No	No
Virtual KVM	No	No
Application License Key	No	No
Security Settings	No	No

Changing user settings through a web browser

The User Administration screen displays user information, enables you to modify user settings, and enable or disable user accounts. The first user account is a fixed null value. You cannot change the properties of the first user or use it to log in. Only the first two users (after the fixed null value) are enabled for login by default. Users can only be enabled from the browser interface.

WARNING! Do not disable all user accounts. If you disable all user accounts you will not be able to log in to LO100. HP recommends always leaving at least one user with administrative privileges.



To modify user settings:

1. On the main menu navigation bar, click **User Administration.**
2. Enter the password in the Password and Confirm Password fields.
3. Select the **User Privilege** level from the list. For more information on user privileges and access rights, see "User administration."
4. (Optional) Change the user name.
5. To save the changes, click **Set.**

Changing user settings through the CLP

The first user is a fixed null value. Customizable users start at user2 and continue through user16. You can only enable users for log in through the browser. However, you can change the values through any connection.

1. Log in to the CLP as described in the "Logging in to LO100" section.
2. At the command prompt, enter `cd map1/accounts`.
3. Select a user by entering `cd user1` or `cd user#`, where # is the user you want to modify and a whole number between 2 and 16.
4. To change the user name, enter `set username=<new username>`. For example:

   ```
   /./map1/accounts/user2/> set username=testuser2
   ```

5. To change the user password, enter `set password=<new password>`, and enter the new password when prompted. For example:

   ```
   /./map1/accounts/user2/> set password=testpswd2
   ```

   Passwords are case-sensitive and can contain up to 16 characters, including quotation marks and &.

6. To change the group name enter, `set group=<new group name>`. Valid group settings are administrator, user, oemhp, and operator. For example:

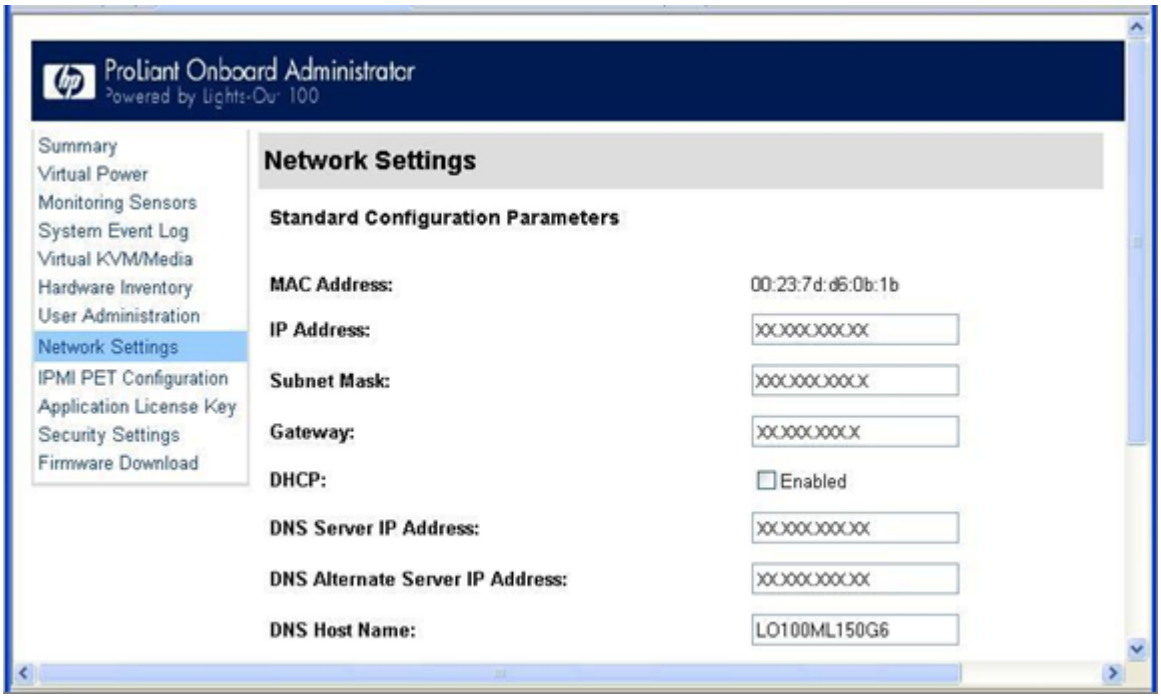
   ```
   /./map1/accounts/user2/> set group=user
   ```

Network settings

You can view and modify network settings for LO100 using a web browser, CLP, or the BIOS Setup Utility. If you change the IP address, the connection to the server terminates. You must reconnect to the server using the new IP address.

Configuring network settings using a web browser

The Network Settings screen displays IP address, subnet mask, and other TCP/IP-related settings. From the Network Settings screen, you can enable or disable DHCP and configure a static IP address for servers not using DHCP. You can view and modify the network settings when logged in as either OEM or administrator (admin).



To modify the network settings, from the browser main menu navigation bar, click **Network Settings,** enter the new settings, and then click **Apply.**

The Network Settings page now lists the following information:

- MAC Address—Displays the MAC address.
- IP Address—Displays the current BMC IP address and enables you to set it to Static.
- Subnet Mask—Displays the LO100 IP network subnet mask. If you are using DHCP, the subnet mask is automatically supplied. If not, enter the network subnet mask.
- Gateway—Displays the IP address of the network gateway. If you are using DHCP, the network gateway IP address is automatically supplied. If not, enter the network gateway address.

  For the static IP to work, all network settings must be correct.
- DHCP—Enables you to set the BMC IP to DHCP by selecting the Enabled box, or to Static by clearing the Enabled box. For the changes to take effect, click **Apply**.

  When setting the BMC IP to Static, to set a valid static IP, you must enter a static IP into the IP Address field before you click **Apply**.
- DNS Server IP Address—Displays IP address of the DNS server.
- DNS Server Alternate IP Address—Displays secondary DNS IP address.
- DNS Host Name—Displays the host name set by user, defaulted to lo100<serial number>. This name is the DNS name associated with the IP address. If DHCP and DNS are configured correctly, this name can be used to connect to the LO100 subsystem instead of the IP address.
- DNS Current Domain Name—Displays the current name of the domain where the LO100 subsystem resides. DHCP assigns this name. This name would be what is currently registered, whether it was returned through option 6, or it was configured locally as a default.
- DNS Configured Domain Name—Displays the domain name set by user as default domain name.
- Register this Connection's Addresses in DNS—Enables you to register these server addresses to the DNS Server on the network. DHCP option 81 is used to register the host name with the appropriate DNS suffix to the DNS server through the DHCP server.
- Use this connection's DNS suffix in the DNS Registration¾Enables you to register the DNS suffix with the DNS server. Enables you to set and use a default domain name if the DHCP server does not offer one through DHCP Option 6.

  Disabling this option can result in the connection using its primary DNS suffix, which is usually the DNS name of the active directory domain to which it is joined.
- Telnet Inactivity Timeout—Enables you to set the total time limit allowed of inactivity (in seconds) during a telnet connection before the connection is terminated.

  To disable Telnet Inactivity timeout, set the field to 0.

  If you are using Windows Vista or Windows Server 2008, from the Windows Features On/Off option of the Programs and Features menu in the Control Panel, you must activate Telnet Server and Telnet CIient.

LO100 enables you to register this connection address in DNS, and use this connection DNS registration. You can use this DNS registration feature only if you have enabled DHCP.

Configuring network settings using the BIOS Setup Utility

To enable a static IP address:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.

4. To set your network BIOS settings, choose one of these options:
   - On ML110 G6 and DL120 G6 servers:
     a. Press the down arrow (↓) key to scroll to IPMI, and press the **Enter** key.
     b. Press the down arrow (↓) key to scroll to LAN Settings, and press the **Enter** key.
     c. Set IP Address Assignment to **Static.**
   - On ML150 G6 servers:
     a. Press the down arrow (↓) key to scroll to the end, and select **BMC LAN Configuration.**
     b. On BMC LAN Configuration, select **Static.**
     c. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the Tab key to move between address fields).
   - On DL160 G6, DL160se G6, DL170h G6, DL180 G6, SL160z G6, SL170z G6, SL170s G6, and SL2x170z G6 servers, and DL165 and SL165z G7 servers:
     a. Press the down arrow (↓) key to scroll to scroll to the LAN Configuration menu. Press the **Enter** key.
     b. On DHCP IP Source, select **Disabled.**
     c. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the **Tab** or period (**.**) key to move between address fields).
5. Press the **F10** key to save and exit.

To enable a DHCP assigned address:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
4. On ML110 G6 and DL120 G6 servers, press the down arrow (↓) key to scroll down to LAN Settings, press the **Enter** key, and then IP Address Assignment to **DHCP.**
5. BIOS settings for DL170h G6, SL170z G6, and SL2x170z G6 servers are set by default. To set your network BIOS settings for other G6 servers, choose one of these options:
   - On ML150 G6 servers:
     a. Press the down arrow (↓) key to scroll to the end, and select **BMC LAN Configuration.**
     b. Set DHCP IP Source to **Static.**
   - On DL160 G6, DL160se G6, DL180 G6, and SL160z G6 servers:
     a. Scroll to the LAN Configuration menu by pressing the down arrow(↓) key. Press the **Enter** key.
     b. Set DHCP IP Source to **Enabled.**
6. To save and exit, press the **F10** key, or to view the new IP Address, allow the server to reset and reenter the BIOS Setup Utility.

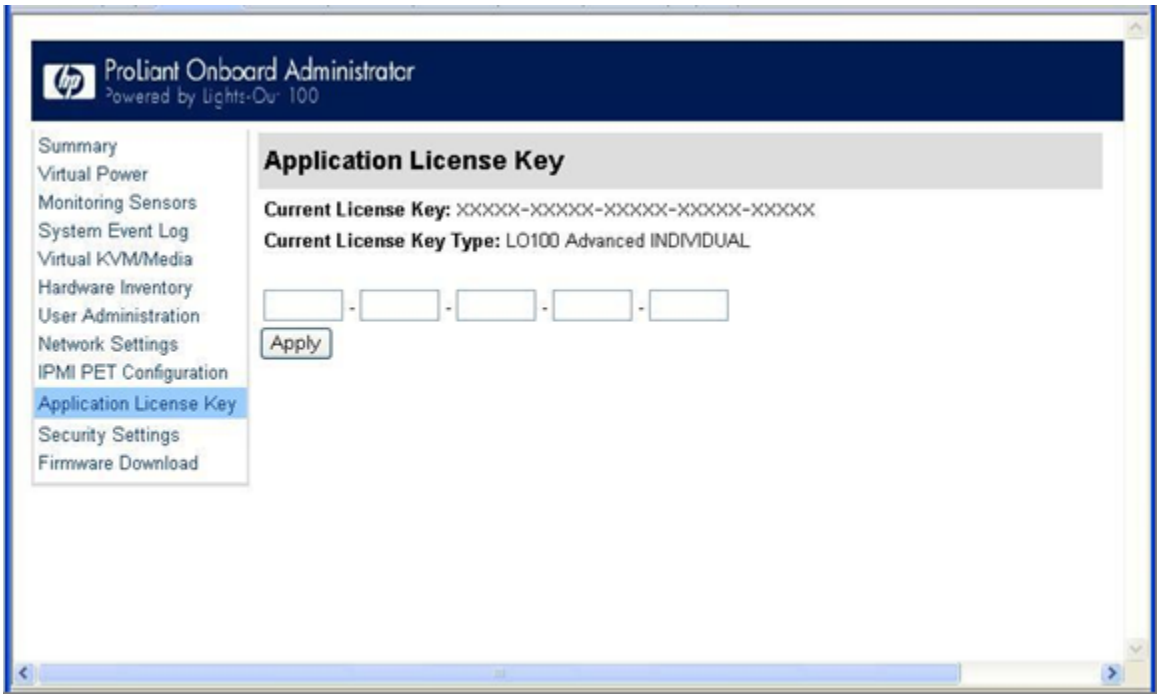
Configuring network settings using the CLP

1. Log in to LO100 CLP as described in the "Logging in to LO100" section.
2. At the command prompt, enter `cd map1/nic1`.
3. Configure the network settings by entering the following: `set <network property>=<new setting>`. Configurable valid network properties are:
   - `networkaddress` specifies the IP address for the NIC. This setting is dynamic.
   - `oemhp_nonvol_networkaddress` specifies the IP address stored in non-volatile memory.
   - `oemhp_mask` specifies the subnet mask for NIC. This setting is dynamic.

- `oemhp_nonvol_mask` specifies the subnet mask stored in non-volatile memory.
- `oemhp_gateway` specifies the gateway IP address for the NIC. This setting is dynamic.
- `oemhp_nonvol_gateway` specifies the gateway IP address stored in non-volatile memory.
- `oemhp_dhcp_enable` specifies whether DHCP is enabled for the NIC. Boolean values are accepted
- `oemhp_nonvol_dhcp_enable` specifies whether DHCP is enabled for the NIC and address stored in non-volatile memory.

Applying a license key

1. Log in to LO100 through a supported browser.
2. To display the license activation screen, click **Application License Key.** If the Application License Key option is not available, you must update the LO100 firmware. For more information, see "Updating the firmware."



3. Enter the license key in the spaces provided. To move between fields, click inside a field or press the **Tab** key. The Activation License Key field advances automatically as you enter data.
4. Click **Apply.**

Importing a certificate

If you do not want to use the preinstalled public key (certificate), create and install your own private key (certificate). Importing a key or certificate is a one-time procedure that supports both SSH and SSL. The key must be generated using external third-party software, placed on a TFTP server, and uploaded to the LO100. For Microsoft® Windows, if you do not have a TFTP software package, use `TFTPD32.EXE`, which is available on the Internet. Linux generally has a TFTP server installed with the operating system. If it is not, see your Linux documentation for more information.

NOTE: When you use the CLP load command with TFTPD32, HP recommends using a 4-second timeout and 10 retries.

NOTE: When using the CLP `load` command in Linux set the timeout to 4000000. The firewall built into some Linux systems might not allow the TFTP server to send and receive information. You might have to disable the firewall to allow these connections. If you are experiencing firewall issues, change the firewall settings to allow connections on port 69 (the default port for TFTP servers). See your firewall documentation for additional information.

Creating a certificate

LO100 requires a 1,024-bit DSA key stored in PEM (Base64-encoded) format to be located on a TFTP server. For example, the following process uses Win32 OpenSSL, downloaded from the Shining Light Productions website (http://www.slproweb.com/products/Win32OpenSSL.html), and the commands issued in a DOS window to generate the certificate. To generate a certificate using Win32 OpenSSL:

1. Download Win32 OpenSSL.
2. Install and set up OpenSSL.
3. Using OpenSSL, generate a DSA parameters file:

   ```
   openssl dsaparam -out server_dsaparam.pem 1024
   ```

4. Generate the DSA private key file, called server_privkey.pem:

   ```
   openssl gendsa -out server_privkey.pem server_dsaparam.pem
   ```

5. Generate the DSA certificate (public key) file, called server cacert.pem:

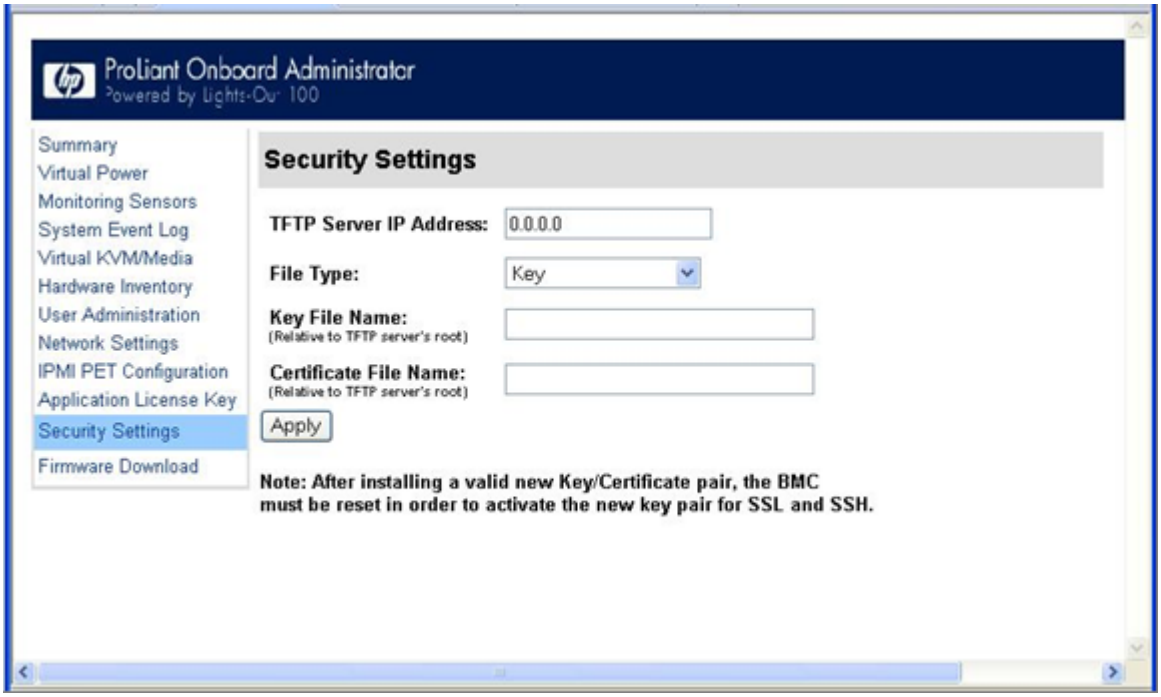
   ```
   openssl req -new -x509 -key server_privkey.pem -out server_cacert.pem -days 1095
   ```

6. When prompted for a distinguished name, enter an appropriate domain name for the servers that will be receiving the certificate.
7. After creating the certificate, copy it to a TFTP server that is accessible on the same network as LO100.

Before importing a certificate or key, you must disconnect from any remote KVMS sessions. Importing a key or certificate will disconnect your session and reset the LO100 processor. After importing a key or certificate and LO100 confirms a successful upload, you must log back into LO100.

Installing a certificate or private key through a web browser

The Security Settings page enables you to install new keys and certificates for SSL and SSH connections.



To install a certificate through the browser:

1. Log in to LO100 as an administrator.
2. On the browser main menu navigation bar, click **Security Settings.**
3. In the TFTP server IP address field, enter the IP address of the TFTP server.
4. On the menu under File type, select **Certificate.**
5. Enter the file name of the certificate created (server_cacert.pem) in the File Name field. Include the path relative to the TFTP server root in the file name.
6. Click **Apply.**

To install the private key through the browser:

1. Log in to LO100 as an administrator.
2. On the browser main menu navigation bar, click **Security Settings.**
3. In the TFTP server IP address field, enter the IP address of the TFTP server.
4. On the menu under File type, select **Key.**
5. Enter the file name of the key created (server_privkey.pem) in the File Name field. Include the path relative to the TFTP server root in the file name.
6. Click **Apply.**

To install the both the certificate and private key through the browser at the same time:

1. Log in to LO100 as an administrator.
2. On the browser main menu navigation bar, click **Security Settings.**
3. In the TFTP server IP address field, enter the IP address of the TFTP server.
4. On the menu under File type, select **Key and Certificate.**
5. Enter the file name of the certificate (server_cacert.pem) and key created (server_privkey.pem) in the File Name field. Include the path relative to the TFTP server root in the file name.
6. Click **Apply.**

Installing a certificate or private key through the CLP

To install a certificate, log in to LO100 as administrator through the CLP interface and issue the load command to upload and install the certificate. For example:

```
load -source <URI> -oemhpfiletype cer
```

where:

- *<URI>* is the `//tftpserver IP/path/filename` to be downloaded.
- *tftpserver* is the URL or IP address of the TFTP server containing the certificate.
- *Path* is the path of the file relative to the TFTP server root.
- *filename* is the file name of the certificate file (`server_cacert.pem` in this example).

After you issue the load command to upload and install the certificate, reset the BMC by entering the following command:

```
rest map 1
```

LO100 checks the validity of the key/certificate pair after you reset the BMC.

You can also find these commands in /map1/firmware directory.

To install a private key, log in to LO100 as administrator through the CLP interface and issue the load command to upload and install the certificate. For example:

```
load -source <URI> -oemhpfiletype key
```

where:

- *<URI>* is the `//tftpserver IP/path/filename` to be downloaded.
- *tftpserver* is the URL or IP address of the TFTP server containing the private key file.
- *Path* is the path of the file relative to the TFTP server root.
- *filename* is the file name of the private key file (`server_privkey.pem` in this example).

After you issue the load command to upload and install the certificate, reset the BMC by entering the following command:

```
reset map 1
```

LO100 checks the validity of the key/certificate pair after you reset the BMC.

You can also find these commands in /map1/firmware directory.

To successfully establish SSH/SSL connections after loading a key or certificate through the CLI or the GUI, and after you click **Apply**, you must reset the BMC by choosing either of the following:

- Issuing the following command from the CLI (`/./-> cd map1 a"reset map 1"`)
- Physically pulling AUX power

HP Systems Insight Manager support

HP Systems Insight Manager discovers LO100 to identify and launch LO100 and its license manager to retrieve or deploy LO100. See your HP Systems Insight Manager user guide for more information on using HP Systems Insight Manager with LO100.

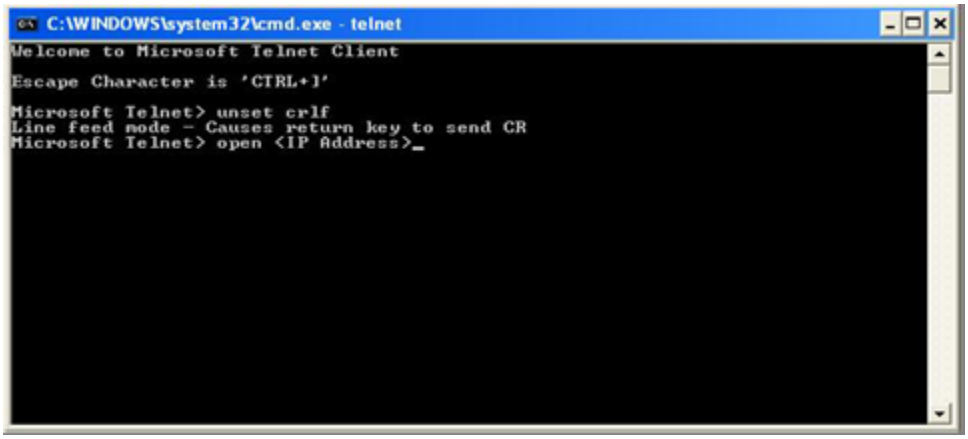
Resolving character and line feed issues

HP recommends using similar operating systems to communicate between the CMS and your applications or workstations. For example, if you are running a Linux CMS, run Linux on your workstations, and use a Linux telnet client. Likewise, if you are running a Windows CMS, run Windows on your workstations, and use a Windows Telnet client.

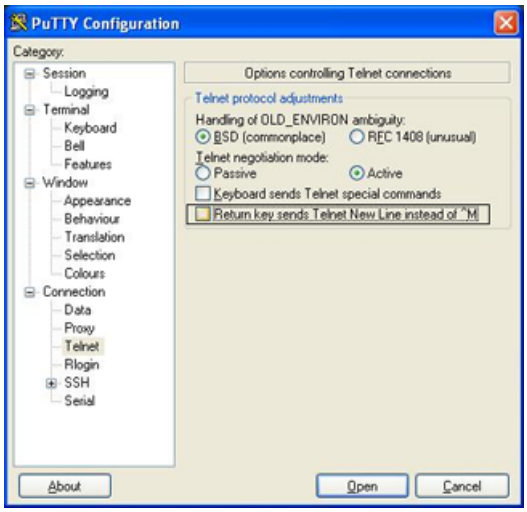
If you run multiple operating systems in your environment, an application limitation issue might occur. For example, running Linux on your servers and using a Windows Telnet client or PuTTY might cause an end of line character issue. If you experience issues, do one the following:

- For a Windows Telnet client to Linux console redirection configuration, make sure Windows Telnet sends a CR for the line feed. To set CR, use the following command for Windows Telnet:

  ```
  unset crlf
  ```



- For applications such as PuTTY with Linux redirection:
  1. Click **Connection>Telnet**.
  2. Clear **Return key sends Telnet New Line instead of ^M.**



LO100 has a default of 0x08 (input) and 0x03 (output) filter setting that must not be changed. If the default settings are changed, functionality issues might occur and you must restore the default settings. After the defaults are reset, you must log out and back in to the shell to restore normal functionality. To restore the default settings, use the following IPMI commands for your environment and operating system:

- To set telnet inbound to 0x08:
  - CLP: `oemhp I 20 c0 20 18 00 29 01 00 00 02 00 08 b4`
  - DOS: `ipmitool 20 c0 29 01 00 00 02 00 08`
  - Linux: `ipmitool raw 0x30 0x29 0x01 0x00 0x00 0x02 0x00 0x08`
- To set telnet outbound to 0x03:
  - CLP: `oemhp I 20 c0 20 18 00 29 01 00 00 02 01 03 b8`
  - DOS: `ipmitool 20 c0 29 01 00 00 02 01 03`
  - Linux: `ipmitool raw 0x30 0x29 0x01 0x00 0x00 0x02 0x01 0x03`

- To set SSH inbound to 0x08:
  - CLP: `oemhp I 20 c0 20 18 00 29 01 00 01 02 00 08 b3`
  - DOS: `ipmitool 20 c0 29 01 00 01 02 00 08`
  - Linux: `ipmitool raw 0x30 0x29 0x01 0x00 0x01 0x02 0x00 0x08`
- To set SSH outbound to 0x03:
  - CLP: `oemhp I 20 c0 20 18 00 29 01 00 01 02 01 03 b7`
  - DOS: `ipmitool 20 c0 29 01 00 01 02 01 03`
  - Linux: `ipmitool raw 0x30 0x29 0x01 0x00 0x01 0x02 0x01 0x03`

For example, to restore the default setting using telnet in Windows:

1. Log in to the CLP interface from a Windows Telnet client.
2. Change the directory to map1 using the command:

   ```
   cd map1
   ```

3. Set input default to 0x08 using the command:

   ```
   oemhp I 20 c0 20 18 00 29 01 00 00 02 00 08 b4
   ```

4. Set output default to 0x03 using the command:

   ```
   oemhp I 20 c0 20 18 00 29 01 00 00 02 01 03 b8
   ```

5. Log out.

Using VLAN Tagging

VLAN tagging is used to isolate the (internal) management traffic from the production traffic (for security and configuration simplicity) without running multiple Ethernet drops to each server. Though VLAN tagging adds some network configuration complexity, significant networking cost savings (as in ports and cables) can be realized.

Server Support

VLAN tagging supports all ProLiant 100 series G5/G6/G7 servers when used with the dedicated management port. It is supported on high-speed shared management ports on most ML G6 and G7 servers.



NOTE: VLAN tagging is not currently supported on the low-speed shared management ports on ML110 G6, DL120 G6, or ML150 G6.

Configuring VLAN Tagging

The following host-based configuration commands are used to configure VLAN tagging:

To set a VLAN ID using an IPMI command type the following:

```
linux: ipmitool raw 0x0c 0x01 0x02 0x14 XX YY
```

where XX = least significant 8 bits of the VLAN ID

YY = bit 7 - 1=enable VLAN; 0=disable

bit [3:0] - most significant 4 bits of the VLAN ID

For example, to enable VLAN ID-809, type the following command:

```
linux: ipmitool raw 0x0c 0x01 0x02 0x14 0x29 0x83
```

4 Technical support

Software technical support and update service

HP LO100i Advanced Packs are available with Technical Support and Update licenses that provide for optional future upgrades. For more information about these options, see the HP website (http://www.hp.com/servers/lights-out).

A license entitlement certificate is delivered in place of a license activation key. The license entitlement certificate is delivered by physical shipment for existing product numbers (with the exception of tracking licenses) and by e-mail for the new electronic license product numbers. The certificate contains information needed to redeem license activation keys online or by fax. This new electronic redemption process enables easier license management and better service and support tracking. For more information, see the HP website (http://www.hp.com/go/ice-license).

HP contact information

For the name of the nearest HP authorized reseller:

- See the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

For HP technical support:

- In the United States, for contact options see the Contact HP United States webpage (http://welcome.hp.com/country/us/en/contact_us.html). To contact HP by phone:
  - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
  - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (http://www.hp.com/hps).
- In other locations, see the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

Before you contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

Acronyms and abbreviations

BIOS	Basic Input/Output System
BMC	baseboard management controller
CLI	Command Line Interface
CLP	command line protocol
CMS	central management server
CR	carriage return
DCMI	Data Center Manageability Interface
DHCP	Dynamic Host Configuration Protocol
DSA	Digital Signature Algorithm
EMS	Emergency Management Services
HTTP	hypertext transfer protocol
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
JVM	Java Virtual Machine
KVM	keyboard, video, and mouse
LO100	HP Lights-Out 100
MAC	Media Access Control
NIC	network interface card
OS	operating system
PEF	Platform Event Filtering
PEM	Privacy Enhanced Mail
PET	Platform Event Trap
POST	Power-On Self Test
RBSU	ROM-Based Setup Utility
SLES	SUSE Linux Enterprise Server
SMASH	System Management Architecture for Server Hardware
SSH	Secure Shell
SSL	Secure Sockets Layer
TCP/IP	Transmission Control Protocol/Internet Protocol
TFTP	Trivial File Transfer Protocol
UID	unit identification
URL	uniform resource locator
VLAN	virtual local area network
VNC	virtual network computing

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