

Dell OpenManage™
Baseboard Management Controller
User's Guide

Notes and Notices



NOTE: A NOTE indicates important information that helps you make better use of your computer.



NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

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December 2004

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Introduction

The Dell™ PowerEdge™ systems baseboard management controller (BMC) monitors the system for critical events by communicating with various sensors on the system board and sends alerts and logs events when certain parameters exceed their preset thresholds. The BMC supports the industry-standard Intelligent Platform Management Interface (IPMI) specification, enabling you to configure, monitor, and recover systems remotely. The BMC provides the following features:

- Access through the system's serial port and integrated NIC
- Fault logging and SNMP alerting
- Access to the system event log (SEL) and sensor status
- Control of system functions including power on and off
- Support that is independent of the system's power or operating state
- Text console redirection for system setup, text-based utilities, and operating system consoles
- Access to Red Hat® Enterprise Linux serial console interfaces by using serial over LAN (SOL).

Dell provides several distinct utilities and programs for accessing the BMC to perform management activities. The following BMC interfaces allow users to configure and manage your system through the BMC.

- The BMC Management Utility allows remote, out-of-band LAN and/or serial port power control, event log access, and console redirection.
- The Dell OpenManage™ Deployment Toolkit Version 1.3 BMCCFG.EXE utility provides a powerful command line configuration tool.
- Dell OpenManage Server Administrator allows remote, in-band access to event logs, power control, and sensor status information and provides the ability to configure the BMC.
- In addition, the BMC can be accessed by standard, off-the-shelf terminal or terminal emulator utilities that allow access to sensor status information, and power control.

Supported Systems

The BMC-management features documented in this guide are supported on the following Dell PowerEdge systems:

- 800
- 1425SC
- 1800
- 1850
- 1855
- 2800
- 2850

BMC Configuration and Management Tasks

This *User's Guide* documents the basic tasks needed to set up and configure the BMC on a managed system in preparation for using the BMC Management Utility. These basic tasks are described in the following sections:

- Configuring the BMC
- Managing the BMC

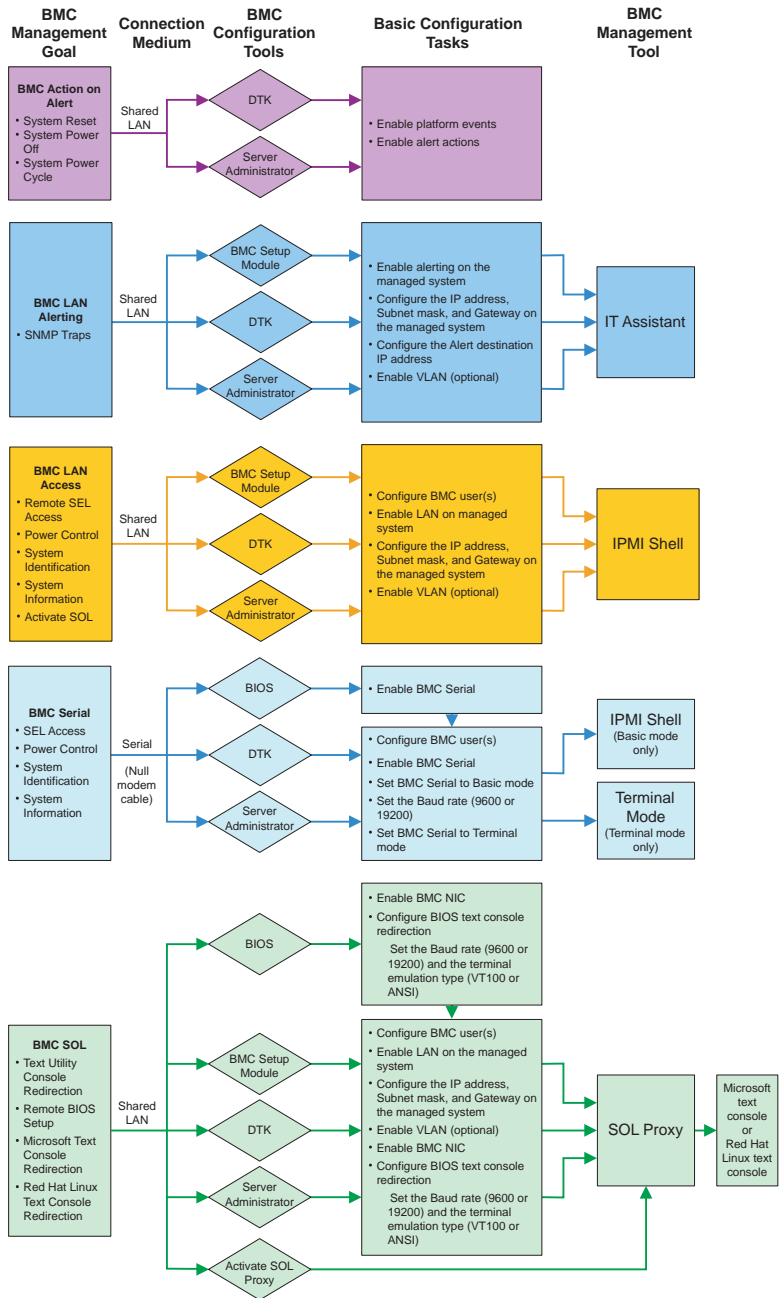
Configuring the BMC

To configure the BMC in a pre-boot environment, you can use either the BIOS BMC Setup Module or the DTK BMCCFG.EXE utility, depending on the scope of your required configuration tasks. Alternately, you can configure the BMC on a managed system with a running operating system using the Server Administrator home page GUI or CLI. See "Baseboard Management Controller Configuration" for more information.

Managing the BMC

To manage the BMC in a pre-boot environment, or to access the BMC of a nonresponsive system, you must use the BMC Management Utility. See "Using the BMC Management Utility." To configure the BMC on a system with a running operating system or to perform everyday BMC management tasks, you can use the GUI on the Server Administrator home page. See the *Server Administrator Version 2.0 User's Guide* for more information about using Server Administrator to manage your system's BMC functions. Figure 1-1 shows the configuration matrix for BMC.

Figure 1-1. BMC Configuration Matrix



BMC Action on Alert

If you plan to use your system's BMC to send BMC alerts, you must follow the BMC Action on Alert configuration guidelines listed in Table 1-1.

Table 1-1. BMC Action on Alert Configuration Guidelines

Features	Connection Medium	BMC Configuration Tools	Basic Configuration Tasks	BMC Management Tools
<ul style="list-style-type: none"> • System Reset • System Power Off • System Power Cycle 	Accessed over a shared LAN	<ul style="list-style-type: none"> • DTK (pre-operating system environment) • Server Administrator 	<ul style="list-style-type: none"> • Enable platform events • Enable alert actions 	NA

Basic BMC Alerting Over a Shared LAN

If you plan to use your system's BMC to only monitor BMC Alerts using IT Assistant, you will need to follow the BMC configuration guidelines listed in Table 1-2.

Table 1-2. BMC LAN Alerting Configuration Guidelines

Features	Connection Medium	BMC Configuration Tools	Basic Configuration Tasks	BMC Management Tools
SNMP Traps	Accessed over a shared LAN	<ul style="list-style-type: none"> • BMC Setup Module (pre-operating system environment) • DTK (pre-operating system environment) • Server Administrator 	<ul style="list-style-type: none"> • Enable alerting on the managed system • Configure the IP address, Subnet mask, and Gateway on the managed system • Configure the Alert destination IP address • Enable VLAN (optional) 	IT Assistant

IPMI Shell Over a Shared LAN

If you plan to use the BMC Management Utility's IPMI Shell to access your system's BMC over a shared LAN, you must follow the BMC configuration guidelines listed in Table 1-3.

Table 1-3. BMC LAN Access Configuration Guidelines

Features	Connection Medium	BMC Configuration Tools	Basic Configuration Tasks	BMC Management Tools
<ul style="list-style-type: none">• Remote SEL access• Power control• System identification• System information	Accessed over a shared LAN	<ul style="list-style-type: none">• BMC Setup Module (pre-operating system environment)• DTK (pre-operating system environment)• Server Administrator	<ul style="list-style-type: none">• Configure BMC user(s)• Enable LAN on managed system• Configure the IP address, Subnet mask, and Gateway on the managed system• Enable VLAN (optional)	IPMI Shell

IPMI Shell Over the Serial Cable

If you plan to use the BMC Management Utility's IPMI Shell or a text console redirection to access your system's BMC over a serial cable, you must follow the BMC configuration guidelines listed in Table 1-4.

Table 1-4. BMC Serial Configuration Guidelines

Features	Connection Medium	BMC Configuration Tools	Basic Configuration Tasks	BMC Management Tools
<ul style="list-style-type: none">• Remote SEL access• Power control• System identification• System information	Accessed through the serial channel by using a null modem cable	<ul style="list-style-type: none">• BIOS (pre-operating system environment)• DTK (pre-operating system environment)• Server Administrator (to enable BMC serial only)	<ul style="list-style-type: none">• Configure BMC user(s)• Enable BMC serial in BIOS• Set BMC serial to either Basic mode or Terminal mode• Set the Baud rate (9600 or 19200)	<ul style="list-style-type: none">• IPMI Shell (Basic mode only)• Terminal emulation (Terminal mode only)

SOL Proxy Over a Shared LAN

If you plan to use the BMC Management Utility's SOL Proxy to access your system's BMC over a shared LAN, you must follow the BMC configuration guidelines listed in Table 1-5.

Table 1-5. BMC SOL Configuration Guidelines

Features	Connection Medium	BMC Configuration Tools	Basic Configuration Tasks	BMC Management Tools
<ul style="list-style-type: none"> • Text Utility console redirection • Remote BIOS setup • Microsoft text console redirection • Red Hat Enterprise Linux text console redirection 	Accessed over a shared LAN	<ul style="list-style-type: none"> • BIOS (pre-operating system environment) • BMC Setup Module (pre-operating system environment) • DTK (pre-operating system environment) • Server Administrator (to enable BMC serial only) 	<ul style="list-style-type: none"> • Configure BMC user(s) • Enable LAN on the managed system • Configure the IP address, Subnet mask, and Gateway on the managed system • Enable VLAN (optional) • Enable BMC NIC in BIOS • Configure the BIOS text console redirection <ul style="list-style-type: none"> – Set the Baud rate (9600 or 19200) and the terminal emulation type (VT100 or ANSI) 	<ul style="list-style-type: none"> • SOL Proxy • Microsoft text console redirection • Red Hat Enterprise Linux text console redirection

BMC Configuration and Management Tools

Using the BMC Setup Module

The BMC Setup Module provides basic BMC setup and configuration functions that can be accessed during system boot. Use the BMC Setup Module for initial BMC setup and configuration only. For advanced configuration tasks, you must use the Deployment Toolkit Version 1.3 BMCCFG.EXE utility or Server Administrator Version 2.0. See your system *User's Guide* for additional information about the BMC Setup Module.

Using the Deployment Toolkit

The Deployment Toolkit (DTK) Version 1.3 BMCCFG.EXE utility provides a powerful DOS-based command-line interface for locally configuring your system's BMC as part of an initial deployment. Use the BMCCFG.EXE utility to set all supported BMC features. In addition, you can use the DTK utilities as part of a scripted deployment to multiple similar systems. To use the BMCCFG.EXE utility, you must perform the following tasks:

- Download the DTK executable and save the utilities to your hard drive.
- Set up a bootable diskette or CD that contains a copy of the BMCCFG.EXE utility.

- Locally configure BMC on the managed system.

See the *Deployment Toolkit Version 1.3 User's Guide* and *Command Line Interface Reference Guide* for more information about using the BMCCFG.EXE utility to configure and manage your system BMC.

Using the BMC Management Utility

The BMC Management Utility provides a command-line, remote management station to manage BMC-supported functions. Use the BMC Management Utility to manage your BMC from a remote management station and as your managed system's emergency management console. The utility gives you the option of using either a command line interface (IPMI Shell) or a serial over LAN proxy (SOL Proxy) to access and manage the BMC. To use the BMC Management Utility, you must perform the following tasks:



NOTE: You must first configure your BMC with the BMC Setup Module, the Deployment Toolkit BMCCFG.EXE utility, or Server Administrator before you can use the BMC Management Utility.

- Configure BMC using the BMC Setup Module, the Deployment Toolkit BMCCFG.EXE utility, or Server Administrator.
- Install the BMC Management Utility on a management station.

See "Configuring Your Managed System" for instructions on configuring the BMC on a managed system in preparation for using the BMC Management Utility. For complete instructions about using the BMC Management Utility to manage your system BMC, see "Using the BMC Management Utility."

Using Server Administrator

Server Administrator Version 2.0 provides a convenient and easy-to-use graphical user interface for remotely configuring or managing your system's BMC on a system running a supported operating system. You can use the Server Administrator Instrumentation Service to configure the most relevant BMC features, such as Platform Event Filter (PEF) parameters and alert destinations. In addition, Server Administrator can be used as command line interface. Server Administrator requires that the system has an operating system installed and functioning. As a result, Server Administrator is best suited for everyday BMC management tasks, and is not an option for performing pre-boot setup or accessing the BMC as an emergency management console. To use Server Administrator, you must perform the following tasks:

- Install Server Administrator on the managed system.
- Remotely access the Server Administrator home page from a supported browser on a management station.
- Remotely configure BMC on the managed system.

See the *Server Administrator Version 2.0 User's Guide* and *Command line Interface User's Guide* for more information about using Server Administrator to configure and manage your system BMC.

Other Dell Documents You May Need

In addition to this *User's Guide*, you can find the following guides either on the Dell Support website at support.dell.com or on the documentation CD:

- The *Dell OpenManage Quick Installation Guide* provides additional information about installing the BMC Management Utility on a management station.
- The *Dell OpenManage Server Administrator Version 2.0 User's Guide* provides additional information about using Server Administrator to manage your system's BMC.
- The *Dell OpenManage Deployment Toolkit Version 1.3 User's Guide* provides additional information about installing and using the Deployment Toolkit utilities.
- The *Dell OpenManage Deployment Toolkit Version 1.3 Command Line Interface Reference Guide* provides a complete list of all valid BMC-related command-line options, suboptions, and arguments.
- The *Dell OpenManage IT Assistant User's Guide Version 7.0* provides information about how to monitor and manage a large number of client and server systems on a local area network (LAN) or wide area network (WAN).
- Your Dell system *User's Guide* provides supplemental information about configuring your BIOS settings with the System Setup Program and your BMC with the BMC Setup Module, as well as instructions for configuring your system to use console redirection.

Additionally, the Dell OpenManage **readme.txt** file provides the latest available information for the installation and operation of the programs and utilities used to manage your system through the BMC. The readme is available on the *Dell OpenManage Systems Management Consoles* CD and on the Dell Support website at support.dell.com.

Obtaining Technical Assistance

If at any time you do not understand a procedure described in this guide or if your product does not perform as expected, help tools are available to assist you. For more information about these help tools, see "Getting Help" in your system's *Installation and Troubleshooting Guide*.

Additionally, Dell Enterprise Training and Certification is available; see www.dell.com/training for more information. This service may not be offered in all locations.

Configuring Your Managed System

Before you can use the BMC Management Utility, you must first configure the necessary system BIOS, network, and serial connection settings to enable access to the BMC.


In addition, to utilize the BMC Management Utility IPMI Serial functions, you must have a working connection between the management station and the correct serial I/O port of the target BMC, using a null modem cable.

This section describes the basic procedures you must perform to prepare your BMC to be accessed and managed using the BMC Management Utility. The following procedures are described:

- BIOS Configuration
- Baseboard Management Controller Configuration
- Configuring Your BMC with the Deployment Toolkit BMCCFG.EXE utility
- Configuring Your BMC with Server Administrator

BIOS Configuration

For most configurations, you must configure the serial port settings and the console redirection settings in your system BIOS before you can use the BMC Management Utility. For example, to access the BMC over a serial cable connection you must configure **Serial Port 1 to BMC Serial**; and to access the BMC over a shared LAN if you are using serial over LAN (SOL) proxy, you must configure **Serial Port 1 to BMC NIC**. In addition, if you plan to utilize the console redirection feature, you must configure **Console Redirection to Serial Port 1**. To configure the necessary system BIOS setting, you must enter the System Setup Program.


 **NOTE:** For more information about configuring BIOS settings, see your system *User's Guide*.

Entering the System Setup Program

- 1 Turn on or restart your system.
- 2 Press <F2> immediately after you see the following message:

<F2> = Setup

The System Setup screen appears.

 **NOTE:** If your operating system begins to load before you press <F2>, allow the system to finish booting, and then restart your system and try again.

- 3 Use the up- and down-arrow keys to navigate to the **Integrated Devices** field and press <Enter>.

- 4 Use the up- and down-arrow keys to navigate to the **Serial Port 1** field and press <Enter>.
- 5 Use the space bar to select the serial port option.

The options are **COM1**, **COM3**, **BMC Serial**, **BMC NIC**, **Off**, and **RAC** (if an optional RAC is installed in the system).

For BMC usage, serial port 1 uses the **COM1** address and communication can be either via the serial port or the integrated shared NIC. RAC control uses only the **COM1** address. **Off** and **COM3** are not available options when Console Redirection is set to use serial port 1.

- a Select **BMC Serial** if you are planning to access the BMC through the serial cable connection.
 - b Select **BMC NIC** if you are using SOL proxy and are planning to access the BMC over a shared LAN.
- 6 Press <Enter> to return to the **System Setup** screen.
 - 7 Use the up- and down-arrow keys to navigate to the **Console Redirection** field and press <Enter>.
 - 8 Use the up- and down-arrow keys to navigate to the **Console Redirection** option and then use the space bar to set the console redirection feature to **Serial Port 1**.
 - 9 Use the up- and down- arrow keys to navigate to the **Failsafe Baud Rate** option and then use the space bar to set the console failsafe baud rate, if applicable.
 - 10 Use the up- and down-arrow keys to navigate to the **Remote Terminal Type** option and then use the space bar to select either **VT 100/VT 200** or **ANSI**, if applicable.
 - 11 Press <Enter> to return to the **System Setup** screen.
 - 12 Press <Esc> to exit the System Setup program. The **Exit** screen displays the following options:
 - Save Changes and Exit
 - Discard Changes and Exit
 - Return to Setup



NOTE: For most options, any changes that you make are recorded but do not take effect until you restart the system.



NOTE: Press <F1> to display the help file for the System Setup program.

Baseboard Management Controller Configuration

You can perform basic BMC configuration using the BMC Setup Module during system startup. For more advanced configuration options, see the instructions for the Deployment Toolkit BMCCFG.EXE utility.

Entering the BMC Setup Module

- 1 Turn on or restart your system.
- 2 Press <Ctrl-E> when prompted after POST.
If your operating system begins to load before you press <Ctrl-E>, allow the system to finish booting, and then restart your system and try again.

BMC Setup Module Options


Table 2-1 lists the BMC Setup Module options and shows how to configure the BMC on a managed system.

Table 2-1. BMC Setup Module

Option	Description
Static IP vs. DHCP Source	Displays whether the network controller will be assigned a static IP address or a DHCP address. NOTE: This option is not available in Dell™ PowerEdge™ 1855.
BMC IP Address	Enter the IP address for a static IP address. The field is limited to a maximum value of 255.255.255.255. NOTE: IP address 169.254.0.2 is returned when the BMC is unable to contact the DHCP server.
Subnet Mask	Enter the subnet mask for the static IP address.
Gateway	Enter the IP gateway for the static IP address.
Alerting	Enables or disables BMC alerting. NOTE: This option is not available in Dell PowerEdge 1855.
Alert Destinations	Enables or disables BMC alerting destinations.
Alert IP Address	Displays the address of the first alert destination.
IPMI Over LAN	Enables or disables the out-of-band LAN channel access to the shared network controller.
User ID	Enables or disables the BMC user ID 2 account.
AdministratorID2 Account	Modifies the administrator account's username and password.

Table 2-1. BMC Setup Module (continued)

Option	Description
MAC Address	Displays the network controller's BMC MAC address.
Reset BMC settings to default	Clears the BMC settings and resets the BMC setting to the defaults.
Hostname	Specifies the managed system hostname used to correlate BMC events to the system on which they originate. NOTE: This option is not available in Dell PowerEdge 1855.
VLAN	Enables and configures a virtual LAN (VLAN) in which the BMC resides.

 **NOTE:** If the first integrated network interface controller (NIC1) is used in an Ether Channel team or link aggregation team, the BMC management traffic will not function properly. For more information about network teaming, see the documentation for the network interface controller.


Configuring Your BMC with the Deployment Toolkit Version 1.3 BMCCFG.EXE Utility

The Dell OpenManage™ Deployment Toolkit (DTK) includes a set of DOS-based utilities for configuring and deploying Dell PowerEdge systems. The DTK BMCCFG.EXE utility is specifically designed to address all necessary BMC configuration tasks using a powerful and comprehensive command-line interface. This utility runs on Dell PowerEdge 1425SC and all supported Dell PowerEdge x8xx systems. The BMCCFG.EXE utility is *not* supported on PowerEdge x7xx or earlier systems.

To use the BMC Management Utility, you must configure your managed system with the BMCCFG.EXE utility. Perform the following tasks:

- Install the Deployment Toolkit Version 1.3.
- Create either a BMC configuration diskette or CD containing a DOS-bootable image, the appropriate CD drivers (for a CD only), and the BMCCFG.EXE utility.
- Configure BMC Users.
- Configure BMC SOL access.
- Configure BMC IPMI serial access.

Installation and Setup

 **NOTE:** See the *Deployment Toolkit Version 1.3 User's Guide* for additional information about installing and using the DTK utilities, and the *Deployment Toolkit Version 1.3 Command Line Interface Reference Guide* for a complete list of all valid options, suboptions, and arguments for using the **BMCCFG.EXE** to configure and manage your BMC.

The DTK components are provided as a self-extracting zip file on the Dell Support website at support.dell.com. The self-extracting file can be opened on any system running a Microsoft® Windows® operating system, or it can be extracted in DOS using the **PKUNZIP.EXE** utility (not supplied with the DTK). By default, the **dtk-1.3-dos-*AXX*.exe** files are extracted to the root directory of your local hard drive, **C:**. This location can be changed by giving a different path when extracting the file. Perform the following steps to extract the DTK components to a workstation running Windows:

- 1 Download the DTK file **dtk-1.3-dos-*AXX*.exe** from the Dell Support website at support.dell.com and save it anywhere on a system running a supported Windows operating system.
- 2 After the zip file is downloaded, double-click the file.
- 3 Click **OK**.
- 4 Click **Unzip**.

By default, the DTK files are unzipped to **C:\Dell\Toolkit**. The **BMCCFG.EXE** utility is located in the **C:\Dell\Toolkit\Tools** directory.

Creating a Bootable Diskette or CD

Use the following guidelines to create bootable media that can be used to configure the BMC on a managed system:

The bootable diskette image must contain, at a minimum, a command parser (**COMMAND.COM**), a configuration file (**CONFIG.SYS**), an initial start-up script (**AUTOEXEC.BAT**), and the appropriate CD drive and network drivers (for a CD only).

 **NOTE:** The DTK utilities support MS-DOS® version 6.22 and later; however, MS-DOS version 7.1 or later is recommended.

- 1 Boot your system in DOS.
- 2 Insert a blank 1.44-MB diskette in the system's diskette drive.
- 3 Type `cd\dos` to get to the DOS directory.
- 4 Type `Format A: /S` to format the diskette and then transfer the files that make the diskette bootable.

- 5 Copy additional files as needed.

For example, type the following, and press <Enter> after each command:

- `copy format*. * a:`
- `copy mscdex*. * a:`
- `copy xcopy*. * a:`
- `copy smartdrv*. * a`
- `copy sys*. * a:`
- and so on

- 6 Create (or edit) an **autoexec.bat** file that loads the drivers for required devices (for example, CD drive drivers).

- 7 Create (or edit) a **config.sys** file that loads the drivers required for the target system devices.

If you are using a bootable diskette to configure the BMC, go to the next step. If you are using a bootable CD to configure the BMC, go to step 9.

- 8 Copy the **BMCCFG.EXE** utility to the Bootable diskette.

You are now ready to use the **BMCCFG.EXE** utility to configure the BMC. Go to "Configuring the BMC."

- 9 Start your CD burning software and generate a DOS-bootable CD using the bootable diskette you just created as the boot image.

- 10 Copy the **BMCCFG.EXE** utility to the root of the CD.

You are now ready to use your bootable CD to configure the BMC on a managed system. Go to "Configuring the BMC."

Configuring the BMC

Before you can use the BMC Management Utility to remotely manage the BMC on a managed system, you must perform some basic configuration tasks. The DTK **BMCCFG.EXE** utility provides a powerful command-line interface for performing the following configuration tasks:

- Configuring BMC users for the managed system
- Configuring the BMC IP address for IPMI LAN access and SOL access for the managed system
- Configuring the BMC serial channel for IPMI serial access for the managed system



NOTE: See the *Deployment Toolkit Version 1.3 User's Guide* for additional information about installing and using the DTK utilities, and the *Command Line Interface Reference Guide* for a complete list of all valid options, suboptions, and arguments for using the **BMCCFG.EXE** to configure and manage your BMC.

Configuring New BMC Users

The BMC is configured by default with user ID 2 set to username: `root`, password: `calvin`. It is highly recommended that you change the user name and password when deploying your system.

- 1 Insert the DOS-bootable BMC configuration diskette or CD into the appropriate drive of the system to be deployed and reboot the system.

- 2 To create a new user, at the command prompt, type:

```
bmccfg username --userid=X --name=name
```

where *X* is a number from 2–10, and *name* is an ASCII string of 16 or fewer characters.

Press <Enter> to execute the command line options.

- 3 To enable the new user ID, at the command prompt, type:

```
bmccfg useraction --userid=X --action=enable
```

Press <Enter> to execute the command line options.

- 4 To set the password for a BMC user, at the command prompt, type:

```
bmccfg passwordaction --action=setpassword --userid=X --password=password
```

where *password* is an ASCII string of 16 or fewer characters.



NOTICE: A password must be set for each BMC user. The BMC firmware does not allow access to users with null user names or passwords.

Press <Enter> to execute the command line options.

Configuring the BMC IP Address

- 1 Insert the DOS-bootable diskette or CD into the appropriate drive of the system to be deployed and reboot the system.

- 2 To configure the BMC IP address source for the LAN channel to DHCP, at the command prompt, type:

```
bmccfg lcp --ipaddrsrc=dhcp
```

Press <Enter> to execute the command line options.

For a complete list of all valid options, suboptions, and arguments for configuring the BMC LAN channel see the *Deployment Toolkit Version 1.3 Command Line Interface Reference Guide*.

- 3 To configure the BMC IP address source for the LAN channel to a static IP address, at the command prompt, type:

```
bmccfg lcp --ipaddrsrc=static --ipaddress=XXX.XXX.XXX.XX
--subnetmask=XXX.XXX.XXX.X --gateway=XXX.XXX.XXX.X
```

Press <Enter> to execute the command line options.

For a complete list of all valid options, suboptions, and arguments for configuring the BMC LAN channel see the *Deployment Toolkit Version 1.3 Command Line Interface Reference Guide*.

Configuring the BMC Serial Channel Access

- 1 Insert the DOS-bootable diskette or CD into the appropriate drive of the system to be deployed and reboot the system.
- 2 To configure the serial port for BMC, at the command prompt, type:

```
bmccfg scp --connectionmode=basic --msgcommbitrate=XXXXXX
```

where XXXXX is the baud rate in bps.

Press <Enter> to execute the command line options.

For a complete list of all valid options, suboptions, and arguments for configuring the BMC serial channel see the *Deployment Toolkit Version 1.3 Command Line Interface Reference Guide*.

Configuring Your BMC with Server Administrator Version 2.0

You can also configure the BMC options using Server Administrator, which is a one-to-one systems management software program that must be installed on the managed system. Once installed, you can remotely access Server Administrator from a management station with a supported browser to perform BMC configuration tasks. See the *Server Administrator User's Guide* for more information about installing and using Server Administrator.

You can configure the BMC settings from either the Server Administrator home page or from its command line interface. Users must have Administrator privileges to access the BMC settings. Users logged in with User or Power User group privileges can view the BMC information but cannot change the settings.

See the *Server Administrator Version 2.0 Command Line Interface User's Guide* for information about configuring the BMC from the command line.

When using Server Administrator, you can click **Help** on the global navigation bar for more detailed information about the specific window you are viewing. Server Administrator help is available for all windows accessible to the user based on user privilege level and the specific hardware and software groups that Server Administrator discovers on the managed system.

Configuring the BMC

The Server Administrator Instrumentation Service allows you to manage Baseboard Management Controller (BMC) features such as general BMC information, configuration of the LAN and serial port, BMC users, and BIOS setup. To use Server Administrator to configure the BMC on a managed system, perform the following steps:



NOTE: You must be logged in with Admin privileges to configure the BMC settings.

- 1 Log in to the Server Administrator home page for the target system.
- 2 Click the **System** object.
- 3 Click the **Main System Chassis** object.
- 4 Click the **BMC** object.
- 5 The **BMC Information** window appears.

- 6 Click the **Configuration** tab.

Under the **Configuration** tab, you can configure LAN, Serial Port, and Serial Over LAN.

- 7 Click the **Users** tab.

Under the **Users** tab, you can modify the BMC user configuration.



NOTICE: A password must be set for each BMC user. The BMC firmware does not allow access to users with null user names or passwords.

- 8 Click the **BIOS Setup** tab.

Under the **BIOS Setup** tab, you can modify the state of the Serial Port, Console Redirection, and Console Redirection Failsafe Baud Rate.

Using the BMC Management Utility

The BMC Management Utility is a collection of software applications that enable remote management and configuration of systems equipped with a BMC. The BMC Management Utility includes the following components:

- Command Line Interface (IPMI Shell)

The IPMI Shell is a scriptable console application program for the control and management of remote systems using the IPMI 1.5 protocol. The IPMI Shell supports both serial access and LAN access to the BMC. It allows administration of one or more managed systems from a command line shell, rather than a graphical user interface (GUI). Use the IPMI Shell to perform the following tasks:

- System power management
- System identification
- Access to the event log
- System identifier control

- Serial-Over-LAN Proxy (SOL Proxy)

The SOL Proxy is a telnet daemon that allows LAN-based administration of remote systems using the Serial Over LAN (SOL) and IPMI 1.5 protocols. Any standard telnet client application, such as HyperTerminal on Microsoft® Windows® or telnet on Red Hat® Enterprise Linux, can be used to access the daemon's features. The SOL protocol coupled with the remote system's BIOS console redirection allows administrators to remotely view and change a managed system's BIOS settings over a LAN. The Red Hat Enterprise Linux serial console and Microsoft's EMS/SAC interfaces can also be accessed over a LAN using SOL.



NOTICE: All versions of the Microsoft Windows operating system include Hilgraeve's HyperTerminal terminal emulation software. However, the included version does not provide many functions required during console redirection. Instead, you can use any terminal emulation software that supports VT100 or ANSI emulation mode. One example of a full VT100 or ANSI terminal emulator that supports console redirection on your system is Hilgraeve's HyperTerminal Private Edition 6.1 or later.



NOTE: See your system *User's Guide* for more information about console redirection, including hardware and software requirements and instructions for configuring host and client systems to use console redirection.



NOTE: HyperTerminal and telnet settings must be consistent with the settings on the managed system. For example, the baud rates and terminal modes should match.

Installing the BMC Management Utility

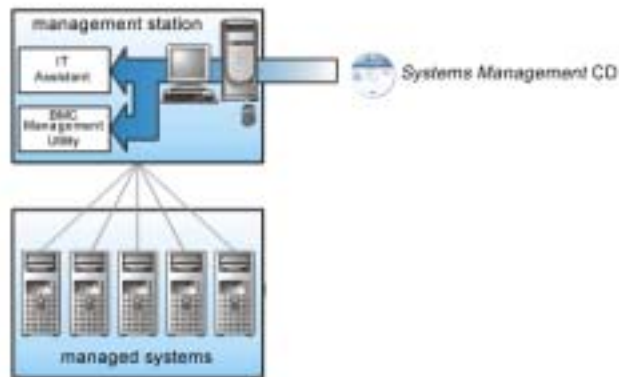
The BMC Management Utility is installed on a management station system in order to remotely connect to the managed system's BMC. See Figure 3-1.

Installation Prerequisites

Before using the BMC Management Utility, you must perform at least the basic BIOS and BMC configuration tasks described in "Configuring Your Managed System."

In addition, to access the BMC using the IPMI serial feature, you must have a working connection between the management station and the correct serial I/O port of the managed system's BMC using a null modem cable.

Figure 3-1. Installing on a Management Station



Supported Operating Systems

The management station must be running one of the following supported operating systems:

- Red Hat Enterprise Linux AS (version 2.1)
- Red Hat Enterprise Linux AS, ES, WS (version 3)
- Microsoft Windows 2000
- Microsoft Windows XP
- Microsoft Windows Server 2003 Web, Standard, and Enterprise Editions

Also ensure that the following conditions are met:

- No version of IT Assistant may be installed on your system.
- SQL server is up and running.

Installation Procedures

The following installation procedures provide step-by-step instructions for installing and uninstalling the BMC Management Utility for each supported operating system:

- Installing/Uninstalling on Systems Running Supported Windows Operating Systems
- Installing/Uninstalling on Systems Running Supported Red Hat Linux Operating Systems

Installing on Systems Running Supported Windows Operating Systems

To install the BMC Management Utility on a management station running the Windows operating system, perform the following steps:

- 1 Log on with administrator privileges to the system where you want to install the system management software components.

- 2 Exit any open application programs and disable any virus-scanning software.

- 3 Insert the *Systems Management Consoles* CD into your system's CD drive.

If the CD does not automatically start the setup program, click the **Start** button, click **Run**, and then type `x:\windows\setup.exe` (where *x* is the drive letter of your CD drive).

The **Dell OpenManage Management Station Installation Version 4.3** screen appears.

- 4 Click **Install, Modify, Repair or Remove Management Station**.

The **Welcome to Install Wizard for Dell OpenManage Management Station** screen appears.

- 5 Click **Next**.

A software license agreement appears.

- 6 Select **I accept the terms in the license agreement**, if you agree.

The **Setup Type** screen appears.

- 7 Select **Custom Setup** and click **Next**.

The **Custom Setup** screen appears.

- 8 From the drop-down, which appears on the left side of BMC Console, select **This feature, and all subfeatures will be installed on the local hard drive**.

To accept the default directory path, click **Next**. Otherwise, click **Browse** and navigate to the directory where you want to install your software, and then click **Next**.

The **Ready to Install the Program** screen appears.

- 9 Ensure that all information is correct and click **Install**.

The **Installing Dell OpenManage Management Station** screen appears and displays the status of the installation.

- 10 When installation is complete, the **Install Wizard Completed** screen appears. Click **Finish**.

See the *Dell OpenManage™ Version 2.0 User's Guide* for additional information about installing the BMC Management Utility on a management station.

By default, the installation program copies the files to the following directory:
C:\Program Files\ Dell\SysMgt\bmc.

The SOL Proxy service does not auto-start after installation. To start the SOL Proxy service after installation, you can either reboot the system (SOL Proxy automatically starts on a reboot), or manually start the service by going to the **bmc** directory and entering the following command:
`solproxy start`

Uninstalling on Systems Running Supported Windows Operating Systems

To uninstall the BMC Management Utility, use the Add/Remove Programs utility in the Control Panel.

Installing on Systems Running Supported Red Hat Linux Enterprise Operating Systems

To install the BMC Management Utility on a management station running the Red Hat Linux Enterprise operating system, perform the following steps:

- 1** Log on as root to the system where you want to install the management station components.
- 2** If necessary, mount the *Systems Management Consoles* CD using the command:
`mount /mnt/cdrom`
- 3** Install the BMC Management Utility with the following command:
`rpm -ivh /linux/bmc/osabmcutil*.rpm`

By default, the installation program copies the files to the following locations:

```
/etc/init.d/solproxy
/etc/solproxy.cfg
/usr/sbin/solproxyd
/usr/bin/solconfig
/usr/bin/ipmish
```

The SOL Proxy will start automatically during system startup. Alternatively, you can go to directory **/etc/init.d** and use the following commands to manage the SOL Proxy service:

```
solproxy status
solproxy start
solproxy stop
solproxy restart
```

Uninstalling on Systems Running Supported Red Hat Linux Enterprise Operating Systems

To uninstall the BMC Management Utility, perform the following steps:

- 1 Log in as `root`.
- 2 Enter the following command to remove all the installed packages.

```
rpm -e osabmcutil
```

If the BMC Management Utility has been uninstalled, you will receive a success message.

IPMI Shell

IPMI Shell is a CLI console application and has no graphical user interface. Its commands and options are specified using command line arguments only.

IPMI Shell supports out-of-band (OOB) access (over a LAN or through the serial port) to a single system at a time, however, multiple IPMI Shell sessions can run simultaneously on the same managed system. See Figure 3-2.

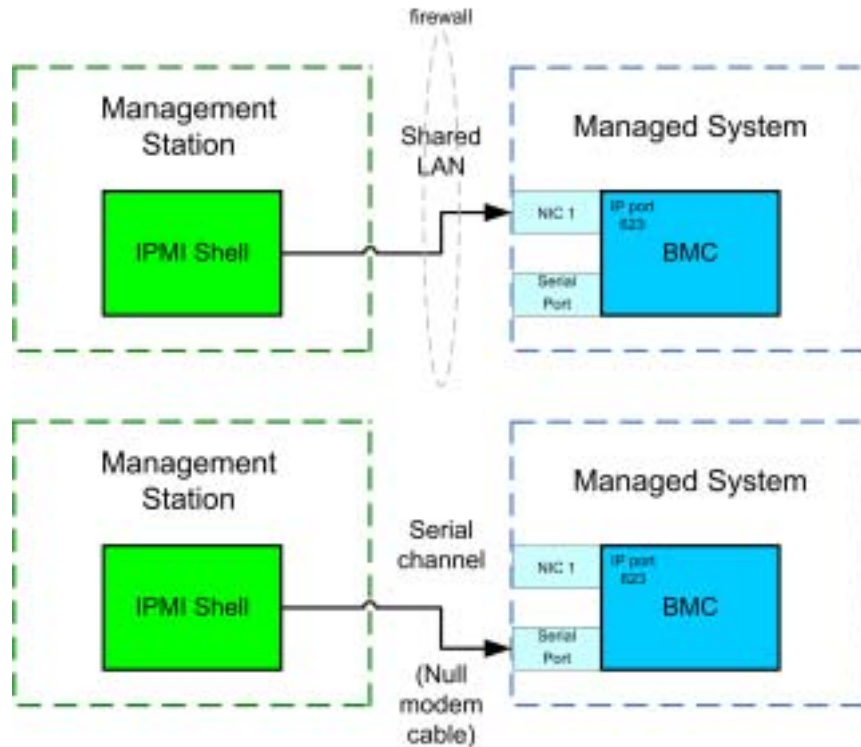
IPMI Shell allows a user with user-level BMC user privileges to:

- Display the current power status.
- Display the 16-byte system GUID of the managed system.
- Display information from the system's field replaceable unit (FRU).
- Display the BMC firmware information.
- Display summary information about the event log.
- Display the logged events.

In addition to the operations that can be performed by a user with user-level BMC user privileges, IPMI Shell allows a user with operator-level and administrator-level BMC user privileges to:

- Power on, reset, or cycle a managed system.
- Simulate a hard power off on a managed system (forcing the system to turn off without shutting down the operating system).
- Delete the system event log (SEL).
- Turn on/off the blinking system identification LED.

To facilitate command scripting, upon successful execution, IPMI Shell terminates with an exit code of zero, and will output the execution results in a parsable format. If an error is encountered, the program exits with a non-zero error code and outputs the error in a parsable format. See "BMC Management Utility Error Codes" for a complete list of possible BMC Management Utility error codes.

Figure 3-2. IPMI Shell Diagram

Using IPMI Shell

To use IPMI Shell, perform the following steps:

On systems running a supported Microsoft Windows operating system:

- 1 Start a **Command Prompt** window.
- 2 Go to the directory where the file `ipmish.exe` is located. By default, `ipmish.exe` is located at the directory: `C:\Program Files\Dell\SysMgt\bmc`.
- 3 Enter IPMI Shell commands (see "IPMI Shell Command Syntax") to manage the remote system. Go to "IPMI Shell Commands" for a complete list of valid options, commands, subcommands, and arguments.

On systems running a supported Red Hat Enterprise Linux operating system:

- 1 Start an operating system (OS) shell.
- 2 Enter IPMI Shell commands (see "IPMI Shell Command Syntax") to manage the remote system. Go to "IPMI Shell Commands" for a complete list of valid options, commands, subcommands, and arguments.

IPMI Shell Command Syntax

The general syntax of IPMI Shell CLI commands is as follows:

```
ipmish [global-option] ... command [; command] ...
```

The general usage for a command is the following:

```
command [subcommand] [command option and argument] ...
```

Both global options and command-specific options are always in the following form:

```
-option argument
```

For example:

```
-help
```

```
-max 20
```

```
-u John
```

Arguments with embedded tabs or spaces must be enclosed in matching double quotation marks (""). For example:

```
-user "John Smith"
```

Every command has one default action. The default action is typically, but not always, the equivalent of reading and displaying the current setting or status for the command.

IPMI Shell Global Options

IPMI Shell has the following global options:

IPMI Session Option **-ip**


Synopsis

```
ipmish -ip bmc_ip_address | bmc_hostname -u username -p password
```

Description

This option is used to establish a connection to a remote managed system using the LAN channel. The IP port specified in installation (default value is 623) is used unless another port has been configured.

Options

 **NOTE:** The following options cannot be used independently. One or more IPMISH commands must follow the option.

`-ip bmc_ip_address | bmc_hostname`

Specifies the IP address or hostname of the remote managed system.

`-u username`

Specifies the BMC username.

`-p password`

Specifies the BMC user password.


IPMI Session Option -com**Synopsis**

```
ipmish -com serial_port -baud baud_rate -flow flow_control
-u username -p password
```

Description

This option establishes a connection to a remote managed system using the serial channel.

Options

 **NOTE:** The following options cannot be used independently. One or more IPMISH commands must follow the option.

`-com serial_port`

Specifies the serial port used when establishing an IPMI session to the managed system. For a system running Windows, the management station port can be 1, 2, 3, and so on. For systems running Red Hat Enterprise Linux, the management station port can be ttyS0, ttyS1, ttyS2, and so on.

`-baud baud_rate`

Specifies the communication baud rate over the serial channel, such as 9600 or 19200. The baud rate for the serial channel should match the baud rate set in the managed system.

`-flow flow_control`

Specifies the data flow control method. There are two flow control options: CTS (hardware flow control) and NONE (no flow control).

`-u username`

Specifies the BMC username.

`-p password`

Specifies the BMC user password.

IPMI Help Option `-help`

Synopsis

`ipmish -help [command]`

Description

This option displays the following information:

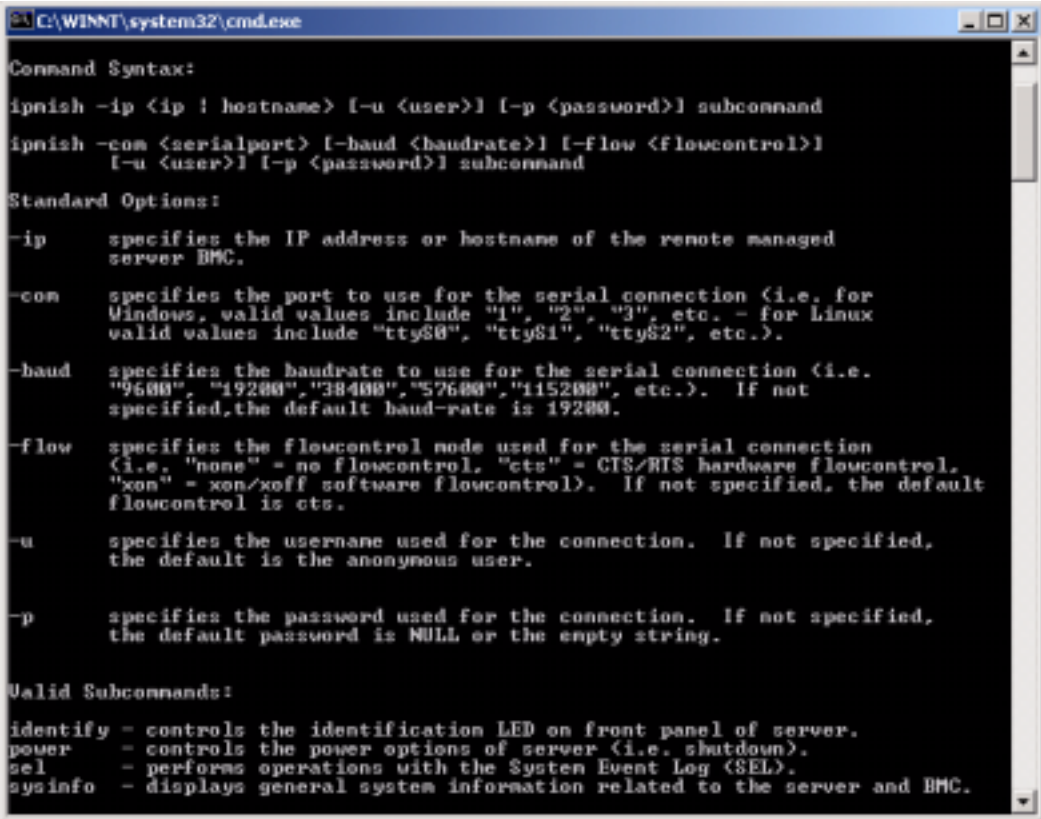
- A summary page for all commands
- A summary of all subcommands for a single command
- A detailed description of a command-subcommand combination

Options

`-help command`

A command list and a capsule description of options are printed if no argument is given. When there is an argument specifying a valid command, the **help** option displays a detailed description of the command. See Figure 3-3 and Figure 3-4.

Figure 3-3. IPMI Help Option Example 1



```

C:\WINNT\system32\cmd.exe

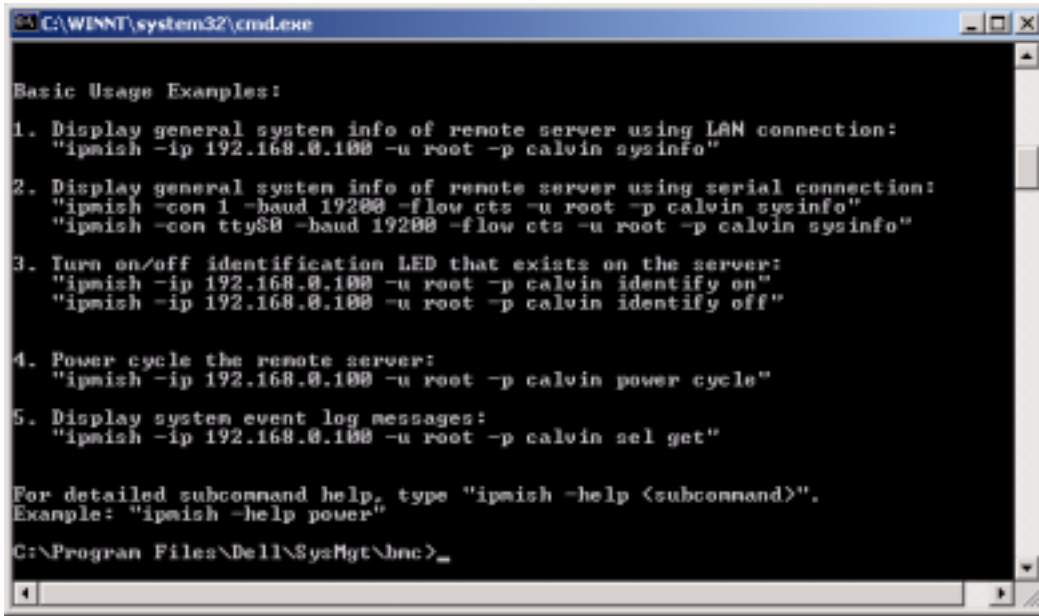
Command Syntax:
ipmish -ip <ip | hostname> [-u <user>] [-p <password>] subcommand
ipmish -com <serialport> [-baud <baudrate>] [-flow <flowcontrol>]
      [-u <user>] [-p <password>] subcommand

Standard Options:
-ip      specifies the IP address or hostname of the remote managed
        server BMC.
-com     specifies the port to use for the serial connection (i.e. for
        Windows, valid values include "1", "2", "3", etc. - for Linux
        valid values include "ttyS0", "ttyS1", "ttyS2", etc.).
-baud    specifies the baudrate to use for the serial connection (i.e.
        "9600", "19200", "38400", "57600", "115200", etc.). If not
        specified, the default baud-rate is 19200.
-flow    specifies the flowcontrol mode used for the serial connection
        (i.e. "none" = no flowcontrol, "cts" = CTS/RIS hardware flowcontrol,
        "xon" = xon/xoff software flowcontrol). If not specified, the default
        flowcontrol is cts.
-u       specifies the username used for the connection. If not specified,
        the default is the anonymous user.
-p       specifies the password used for the connection. If not specified,
        the default password is NULL or the empty string.

Valid Subcommands:
identify - controls the identification LED on front panel of server.
power    - controls the power options of server (i.e. shutdown).
sel      - performs operations with the System Event Log (SEL).
sysinfo  - displays general system information related to the server and BMC.

```

Figure 3-4. IPMI Help Option Example 2



IPMI Shell Commands

Table 3-1 lists IPMI Shell commands with a brief description.

Table 3-1. IPMI Shell Commands

Command	Description
identify	Controls the identification LED on the front panel.
sysinfo	Retrieves and displays managed system information.
power	Controls the power state of the managed system.
sel	Displays or deletes information from the SEL.

identify

Synopsis

```
identify [on [-t seconds] | off]
```

Description

This command controls the identification LED on the front panel. See Figure 3-5.

Subcommands

on

off

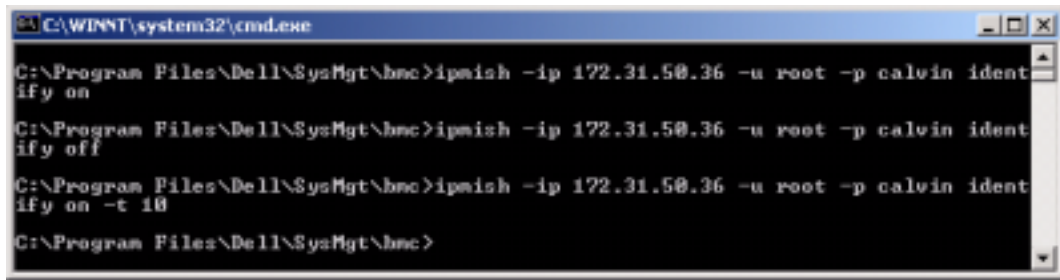
Turns the managed system's front panel LED on or off. If the BMC supports the IPMI extension **Chassis Identify On** command, then the **identify on** command turns the LED on indefinitely until the **identify off** command is used to turn the LED off.

Options`-t seconds`

Specifies how long the LED is on. It should be no longer than 255 seconds.

Default Subcommand

If a subcommand is not specified, this command acts the same as the **identify on** command.

Figure 3-5. identify Option Example


```

C:\WINNT\system32\cmd.exe
C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin identify on
C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin identify off
C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin identify on -t 10
C:\Program Files\Dell\SysMgt\bmc>

```

sysinfo**Synopsis**

```
sysinfo [fru | id]
```

Description

This command retrieves and displays the system information, including field replaceable unit (FRU) and BMC information for the managed system. See Figure 3-6.

Subcommands

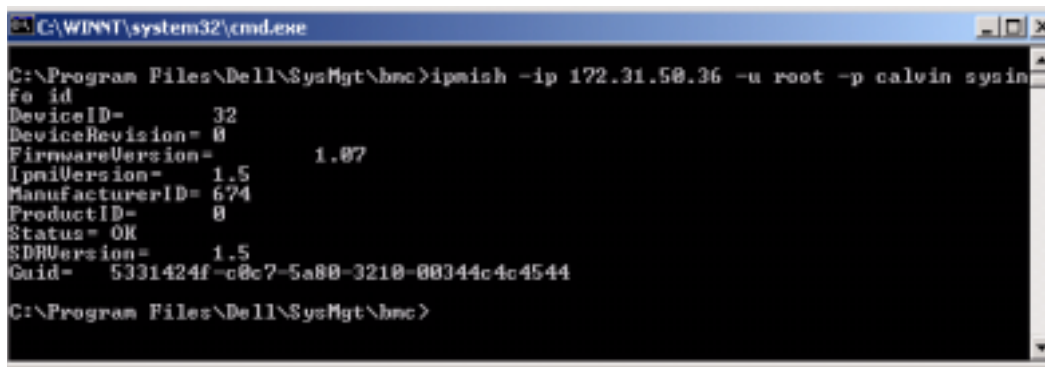
`fru` — Returns FRU related information

`id` — Returns BMC related information

Default Subcommand

If a subcommand is not specified, this command acts the same as `sysinfo id`. See Figure 3-6.

Figure 3-6. sysinfo Option Example



```
C:\WINNT\system32\cmd.exe
C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin sysinfo id
fo id
DeviceID=      32
DeviceRevision= 0
FirmwareVersion=      1.07
IpmiVersion=    1.5
ManufacturerID= 674
ProductID=     0
Status= OK
SDRVersion=    1.5
Guid= 5331424f-c0c7-5a80-3210-00344c4c4544
C:\Program Files\Dell\SysMgt\bmc>
```

power

Synopsis

power status

power off [-force] | on | cycle | reset

Description


This command displays the current power status of the managed system, turns the system on or off, or resets the system. See Figure 3-7.

Subcommands

status — Displays the current power status of the system, the returned value is “on” or “off”.

on — Turns on the managed system.

off — Issues a “graceful shutdown” IPMI command.

 **NOTE:** The **off** subcommand does not function while the operating system is booting on the managed system or if the operating system is locked up. Additionally, this suboption does not function if you are not currently logged in the managed system.

cycle — Turns off the system, pauses, then turns the system back on.

reset — Pulses the system reset signal, regardless of the power state.

Options

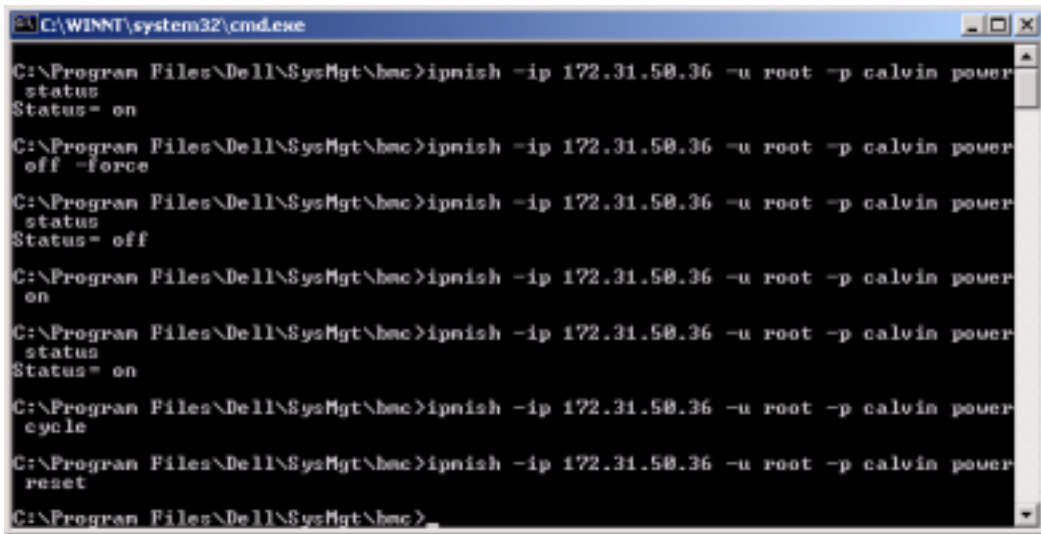
-force

This option simulates pressing the power button, forcing the system to turn off without shutting down the operating system.

Default Subcommand

If a subcommand is not specified, this command acts the same as **power status**. See Figure 3-7.

Figure 3-7. power Option Example



```

C:\WINNT\system32\cmd.exe
C:\Program Files\Dell\SysMgt\bmc>ipnish -ip 172.31.50.36 -u root -p calvin power
status
Status= on
C:\Program Files\Dell\SysMgt\bmc>ipnish -ip 172.31.50.36 -u root -p calvin power
off -force
C:\Program Files\Dell\SysMgt\bmc>ipnish -ip 172.31.50.36 -u root -p calvin power
status
Status= off
C:\Program Files\Dell\SysMgt\bmc>ipnish -ip 172.31.50.36 -u root -p calvin power
on
C:\Program Files\Dell\SysMgt\bmc>ipnish -ip 172.31.50.36 -u root -p calvin power
status
Status= on
C:\Program Files\Dell\SysMgt\bmc>ipnish -ip 172.31.50.36 -u root -p calvin power
cycle
C:\Program Files\Dell\SysMgt\bmc>ipnish -ip 172.31.50.36 -u root -p calvin power
reset
C:\Program Files\Dell\SysMgt\bmc>

```

sel

Synopsis

```
sel status
```

```
sel get [ [-begin index1 ] [-end index2 | -max count] ] | [-last n]
```

```
sel clear
```

Description

This command displays event log information, displays the contents of the event log, and deletes all the event log records. See Figure 3-8.

Subcommands

`status` — Displays the total number of system event log records.

`get` — Prints all or part of the event log.

`clear` — Deletes all the records in the event log.

Options

`-begin index1`

Specifies the first record to display.

`-end index2`

Specifies the last record to display.

`-max count`

Specifies the maximum number of records to display.

If the value of the argument `count` is bigger than the total number of the records, the last record displayed will be the last one in the event log.

`-last n`

Specifies the number of records to be displayed, starting from the last record and counting backwards.

Default Subcommand

If a subcommand is not specified, this command acts the same as `sel status`.

Display Format

System event log records are displayed using a tabular format. The column headers are: **Ordinal Number**, **Date**, **Time**, **Sensor Number**, **Sensor Type**, and **Brief Description**. See Figure 3-8.

Figure 3-8. sel Option Example

```

C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.58.36 -u root -p calvin sel g
et -begin 2 -end 5
2= 2004/10/25 14:37:04, #3 Temperature, Upper Non-critical - goi
ng high (deassertion event)
3= 1970/01/03 11:58:52, #67 Power Supply, Power Supply Failure det
ected
4= 1970/01/03 11:58:52, #67 Power Supply, Power Supply AC lost
5= 1970/01/03 11:58:52, #83 Power Supply, Redundancy Lost

C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.58.36 -u root -p calvin sel g
et -begin 3 -max 2
3= 1970/01/03 11:58:52, #67 Power Supply, Power Supply Failure det
ected
4= 1970/01/03 11:58:52, #67 Power Supply, Power Supply AC lost

C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.58.36 -u root -p calvin sel g
et -last 3
3= 1970/01/03 11:58:52, #67 Power Supply, Power Supply Failure det
ected
4= 1970/01/03 11:58:52, #67 Power Supply, Power Supply AC lost
5= 1970/01/03 11:58:52, #83 Power Supply, Redundancy Lost

C:\Program Files\Dell\SysMgt\bmc>

```

SOL Proxy

SOL Proxy is a simple telnet server. It allows a telnet client to interact with the hardware-designated serial port of a remote managed system using the LAN communication channel. See Figure 3-9. With SOL Proxy, administrators can view and change the BIOS settings over a shared LAN. In addition, you can also access your managed system's BMC using SOL Proxy using the Red Hat Enterprise Linux serial console and Microsoft's EMS/SAC interfaces. SOL Proxy does not support in-band or serial connection to the managed system's BMC.

When BIOS console redirection to serial port is enabled on the remote managed system, any application that uses the BIOS to read from or write to the system console will have its I/O redirected to the designated serial I/O port. When SOL is activated, the BMC firmware reads any data written to the serial port and transmits it to the SOL Proxy as LAN packets. SOL Proxy then forwards the data to the telnet client as TCP/IP packets.

Conversely, any keyboard activity at the telnet client is sent to the BMC by SOL Proxy. BMC then writes the packets to the system serial I/O port.


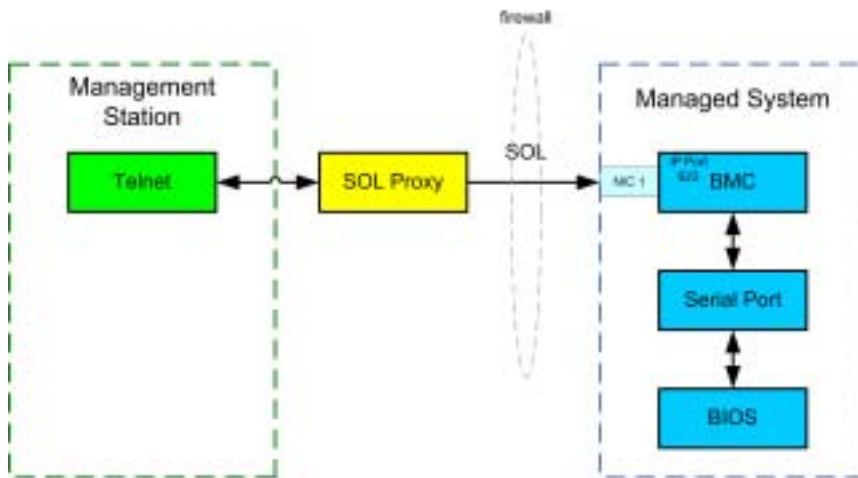
 **NOTE:** See your system *User's Guide* for more information about console redirection, including hardware and software requirements and instructions for configuring host and client systems to use console redirection.

Figure 3-9. SOL Proxy Diagram





The SOL Proxy communication scheme enables you to view and configure the BIOS settings of a managed system, as well as to reset the managed system remotely using a telnet client. SOL Proxy is installed as a daemon service and automatically starts each time the system boots. SOL Proxy can accommodate only one telnet session at a time.

You can use a variety of telnet clients to access SOL Proxy features. For example:


- In a Windows environment, you can use a Command Prompt window as your console. However, function keys such as <F1> and <F2> will not operate correctly with this client except on systems running Windows Server 2003.
- In a Windows environment, you can also use any telnet application that supports VT100 or ANSI emulation mode (such as HyperTerminal) as your console. HyperTerminal key mappings are based on the supported terminal emulation modes and do not support some useful terminal types. For example, HyperTerminal does not support the “Linux” terminal mode (a modified VT100 terminal). If you use HyperTerminal to connect to a Red Hat Enterprise Linux console (redirected by SOL) the function and arrow keys may not work, based on the “tty” settings of the remote application.

➡ NOTICE: All versions of the Microsoft Windows operating system include Hilgraeve's HyperTerminal terminal emulation software. However, the included version does not provide many functions required during console redirection. Instead, you can use any terminal emulation software that supports VT100 or ANSI emulation mode. One example of a full VT100 or ANSI terminal emulator that supports console redirection on your system is Hilgraeve's HyperTerminal Private Edition 6.1 or later.

 **NOTE:** When using HyperTerminal, you must deselect the **Wrap lines that exceed terminal width** check box to avoid console redirected data that may appear to be corrupted or garbled. To deselect this feature, click **File**→**Properties**→**Settings**→**ASCII Setup...**→**Wrap lines that exceed terminal width**.

 **NOTE:** See your system *User's Guide* for more information about console redirection, including hardware and software requirements and instructions for configuring host and client systems to use console redirection.

- In a Red Hat Enterprise Linux environment, you can use a shell such as **cs**h or **ks**h as your console, or you can use any telnet application supporting VT100 or ANSI emulation mode.

 **NOTE:** HyperTerminal and telnet settings must be consistent with the settings on the managed system. For example, the baud rates and terminal modes should match.

You can also send the terminal break function while in console redirection. The use of this functionality requires that the specific terminal program in use has the ability to send the break function. For example, Red Hat Enterprise Linux telnet modules have the capability of sending the break signal by typing:

```
Ctrl+]send brk<Enter>
```

The Red Hat Enterprise Linux SysRq function is one example of an advanced debugging feature that is enabled by use of the break function. Refer to the Red Hat Enterprise Linux documentation to see how to use this feature.

Using SOL Proxy


Depending on the console you use, there are different steps for accessing SOL Proxy. Throughout this section, the management station where the SOL Proxy is running is referred to as the SOL Proxy Server.

Using the Windows Command Prompt

To connect and use SOL Proxy:

- 1 Open a Command Prompt window on your management station.
- 2 Enter the **telnet** command in the command-line and provide the IP address of the SOL Proxy server and the port number that you specified in the SOL Proxy installation (the default value is 623). Such as:

```
telnet 192.168.1.24 623
```


 **NOTE:** The IP address and port number you provide should conform to the ones defined in the SOL Proxy configuration file. For more details, see “Configuring SOL Proxy with the SOL Proxy Configuration File.”

- 3 If you are prompted for a username, provide the operating system login credentials of the SOL Proxy Server.

- 4 Provide a password when prompted. SOL Proxy will use this combination of operating system username and password to authenticate you on SOL Proxy Server. The specific authentication scheme will depend on the operating system configuration for the SOL Proxy Server. However, if **localhost** or an IP address of 127.0.0.1 is used, it is assumed that the user has login privileges to the current host, and is not prompted for a username and password.
- 5 After authentication is performed, you will see a login successful message and the SOL Proxy main menu prompt. You are ready to use SOL Proxy. See "SOL Proxy Main Menu" for further instructions.

Using Windows HyperTerminal Console

To connect and use SOL Proxy:


- 1 Open a HyperTerminal session on your management station.
- 2 Create a new TCP/IP connection, providing the IP address of SOL Proxy Server and the port number you specified in SOL Proxy installation (the default value is 623). The Emulation mode is VT100 and ANSI.
 **NOTE:** The IP address and port number you provide should conform to the ones defined in the SOL Proxy configuration file. For more details, see "Configuring SOL Proxy with the SOL Proxy Configuration File."
- 3 Click the **Connect** button in the toolbar to try the newly defined connection.
- 4 If you are prompted for a username, provide the operating system login credentials for SOL Proxy Server.
- 5 Provide a password when prompted. SOL Proxy uses this combination of operating system username and password to authenticate you on SOL Proxy Server. The specific authentication scheme depends on the operating system configuration for the SOL Proxy Server. However, if **localhost** or an IP address of 127.0.0.1 is used, it is assumed that the user has login privileges to the current host, and is not prompted for a username and password.
- 6 After authentication is performed, you will see a login successful message and the SOL Proxy main menu prompt. You are ready to use SOL Proxy. See "SOL Proxy Main Menu" for further instructions.

Using a Red Hat Enterprise Linux Shell

To connect and use SOL Proxy:

- 1 Open a Red Hat Enterprise Linux shell on your management station.
- 2 Enter the **telnet** command and provide the IP address of the SOL Proxy Server and the port number you specified in SOL Proxy installation. For example:

```
telnet 192.168.1.24 623
```

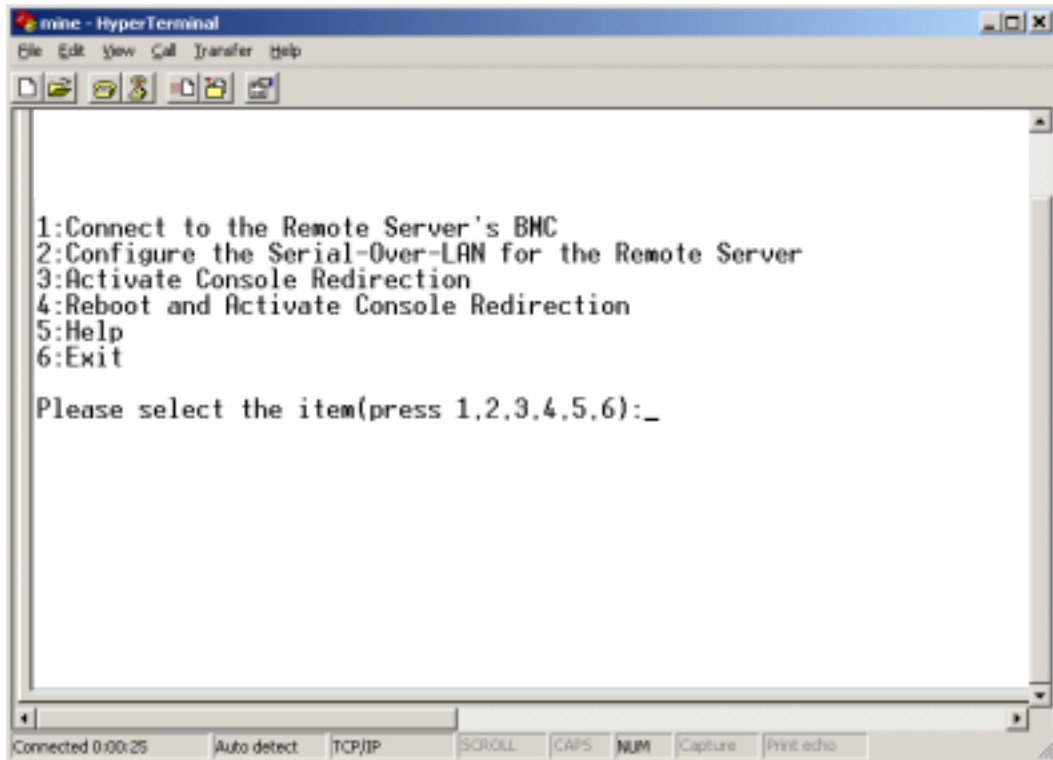
 **NOTE:** The IP address and port number you provide should conform to the ones defined in the SOL Proxy configuration file. For more details, see "Configuring SOL Proxy with the SOL Proxy Configuration File."

- 3 If you are prompted for a username, provide the operating system login credentials of SOL Proxy Server.
- 4 Provide a password when prompted. SOL Proxy will use this combination of operating system username and password to authenticate you on SOL Proxy Server. The specific authentication scheme will depend on the operating system configuration for the SOL Proxy Server. However, if `localhost` or an IP address of `127.0.0.1` is used, it is assumed that the user has login privileges to the current host, and is not prompted for a username and password.
- 5 After authentication is performed, you will see a login successful message and the SOL Proxy main menu prompt. You are ready to use SOL Proxy. See "SOL Proxy Main Menu" for further instructions.

SOL Proxy Main Menu

After the telnet connection with SOL Proxy is successfully established, you are presented with the following menu of choices. See Figure 3-10.

Figure 3-10. SOL Proxy Main Menu Example



The SOL Proxy main menu allows you to change the SOL settings of a remote managed system's BMC, reboot the remote BMC, or activate console redirection.

When you select menu option 1, **Connect to the Remote Server's BMC**, you are prompted for the BMC IP address and BMC login. After you enter the required information and make a successful connection, the internal state SLP is changed to "connected." If you select menu options 2, 3, or 4, and the application state is not "connected," you are prompted to connect to a BMC.

Menu option 2 allows you to enable, disable, and configure the SOL defaults, including the minimum user privilege level required for activating SOL and the communication baud-rate.

Menu options 3 and 4 allow you to establish a SOL remote console session through the SOL Proxy main menu. Menu option 3 establishes a SOL session without changing the remote system's state. This option is ideal for connecting to the Microsoft SAC/EMS or the Red Hat Enterprise Linux console. Menu option 4 reboots the remote managed system and establishes a SOL session. This option is best suited for performing BIOS setup and system configuration tasks.

To exit an active SOL session, use the <~><.> character sequence. This sequence terminates SOL and returns you to the top-level menu.

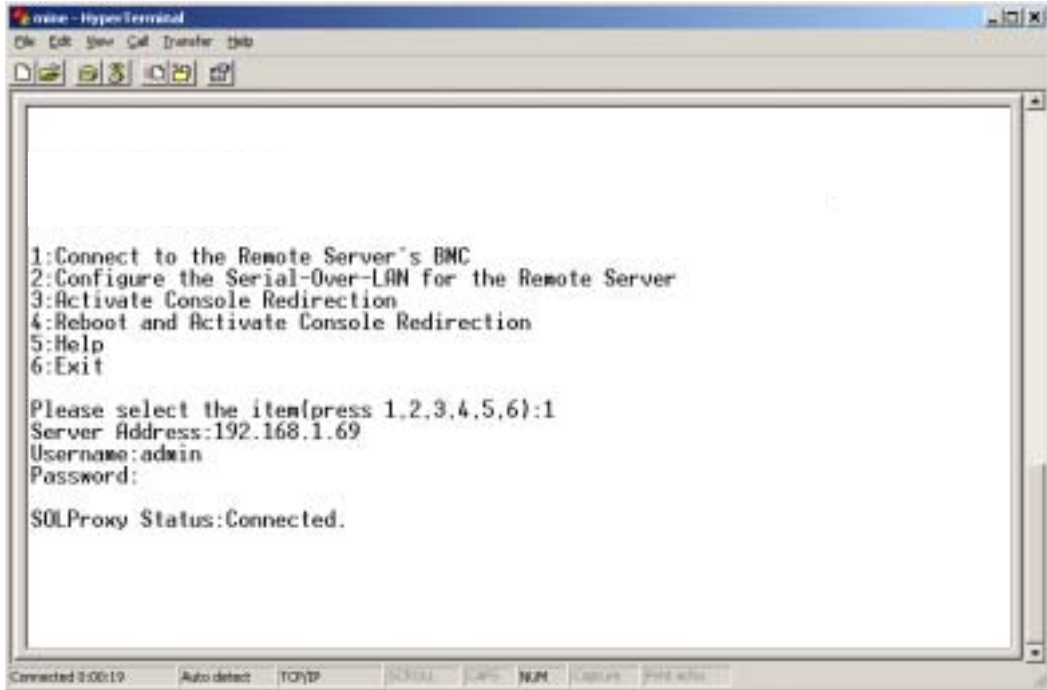
Connecting to the Remote Managed System's BMC



NOTE: While multiple SOL sessions can be active at the same time, only one console redirection session can be active at any given time for a managed system.

- 1 Select option 1 in the main menu.
- 2 Enter the BMC IP address of the remote managed system.
- 3 Provide the BMC username and password for the BMC on the managed system. The BMC username and password must be assigned and stored in the BMC non-volatile storage. See "Configuring Your Managed System" for more information about configuring BMC users. Only one SOL session with one BMC is permitted at one time.

The connection status displays on the main menu. See Figure 3-11.

Figure 3-11. Connecting to the Remote System's BMC**Configuring the SOL for the Remote Managed System**

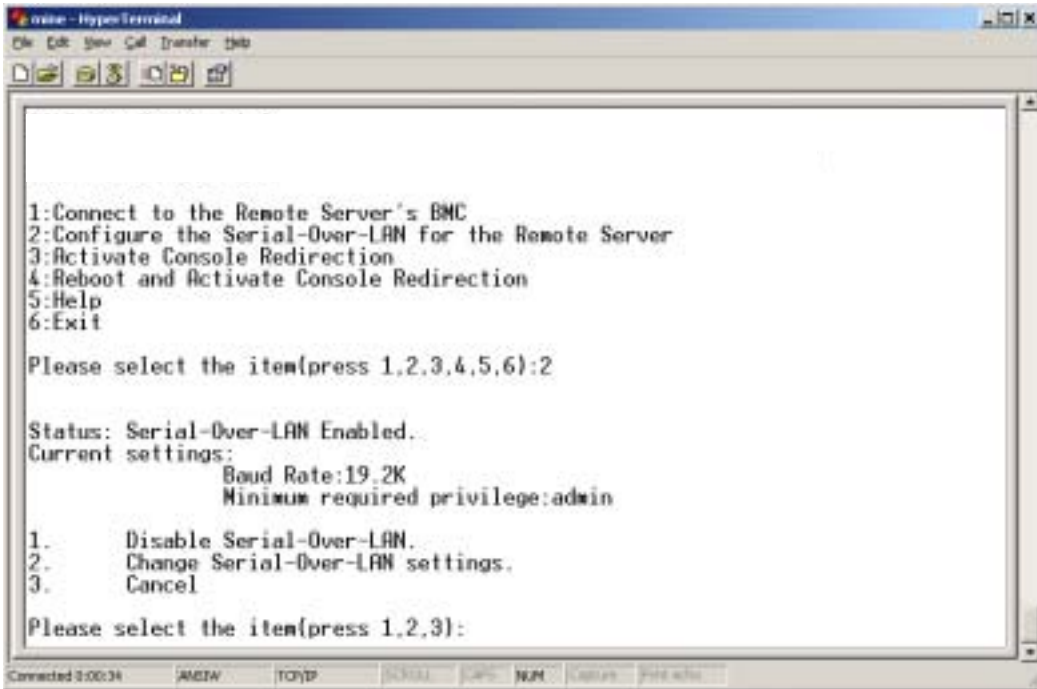
Select option 2 in the main menu.

NOTE: You must be connected to the managed system's BMC before you can configure the SOL features. If SOL Proxy is not yet connected to the managed system's BMC, you are prompted for an IP address and a username/password combination. See "Connecting to the Remote Managed System's BMC" for more information.

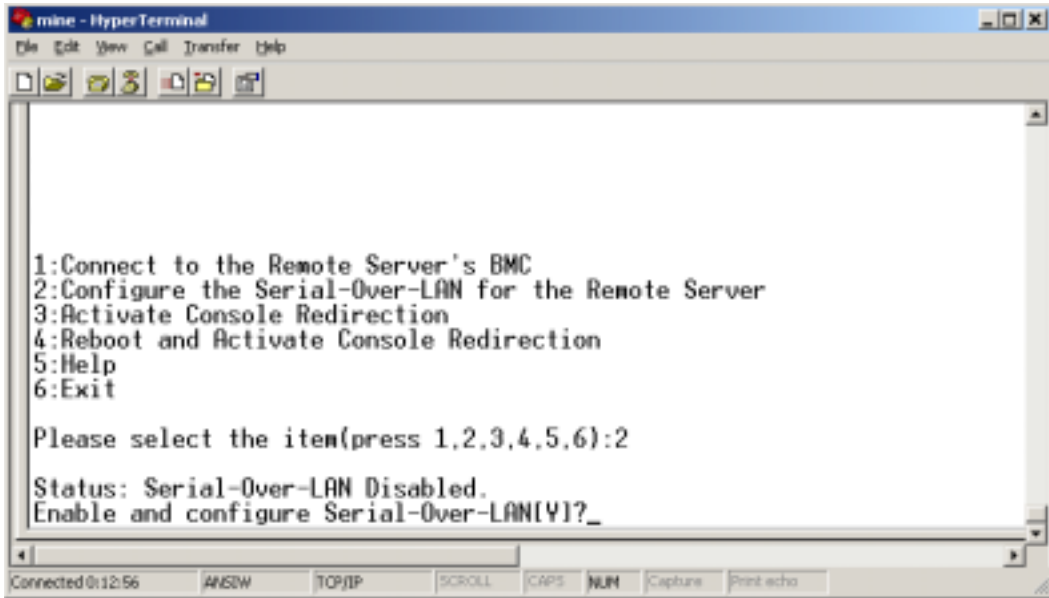
The SOL configuration menu appears. According to the current SOL status, the content of the SOL configuration menu varies:

- If SOL is already enabled, the current settings are displayed and you are presented with three choices. See Figure 3-12.

Figure 3-12. Configuring the Serial-Over-LAN for the Remote System, Example 1

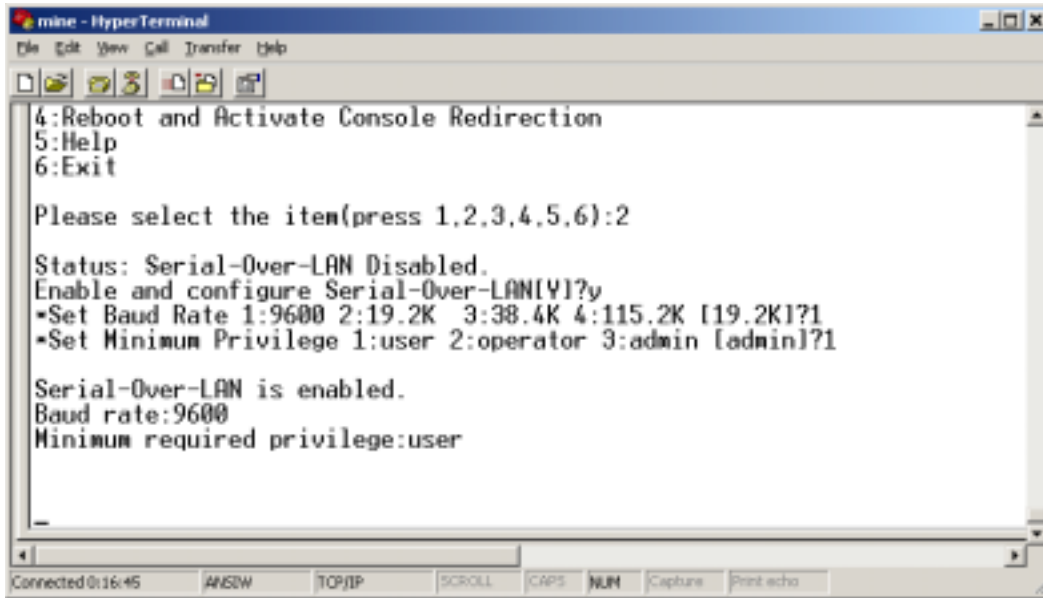


- If SOL is currently disabled, the options shown in Figure 3-13 are displayed. Type **Y** to enable SOL or **N** to keep SOL disabled. See Figure 3-13.

Figure 3-13. Configuring the Serial-Over-LAN for the Remote System, Example 2

- If SOL is enabled, two BMC settings are displayed:
 - The communication baud-rate between the system serial port and the BMC
 - The minimum BMC user privilege level required for activating console redirectionSOL Proxy displays a list of valid values for each feature, as well as the current value of the feature enclosed in a pair of brackets. Select the number before a value to set it as the new setting, and press <Enter> to confirm your changes. The new BMC settings are then displayed. See Figure 3-14.

Figure 3-14. Configuring the Serial-Over-LAN for the Remote System, Example 3



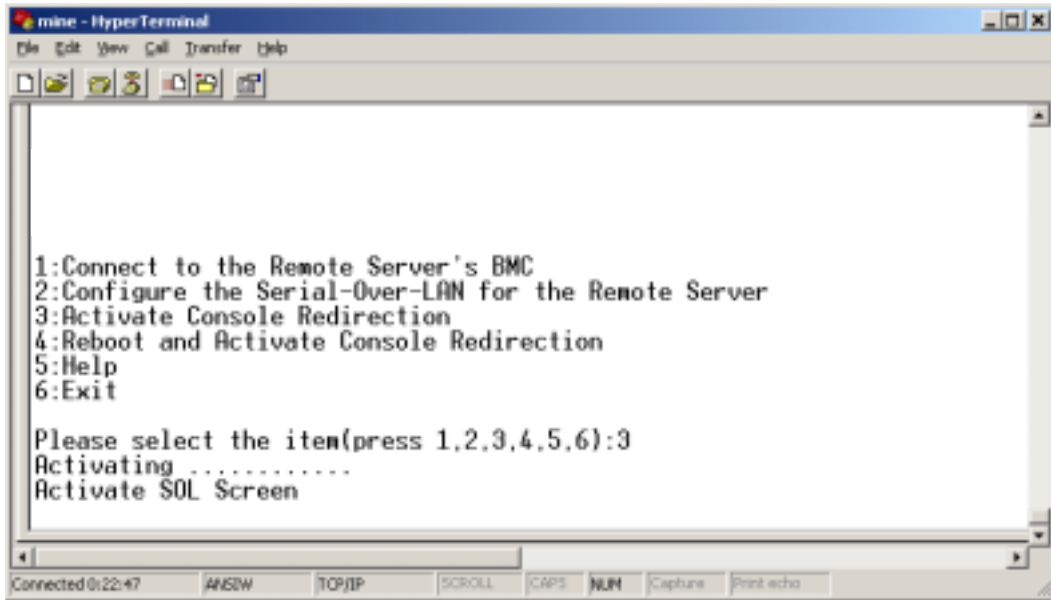
Activating Console Redirection

Select option 3 in the main menu.

NOTE: You must be connected to the managed system's BMC before you can configure the SOL features. If SOL Proxy is not yet connected to the managed system's BMC, you are prompted for an IP address and a username/password combination. See "Connecting to the Remote Managed System's BMC" for more information.

The remote managed system's text console is redirected to your management station. See Figure 3-15.

NOTE: BIOS Console Redirection must be enabled on the managed system and correctly configured before SOL can be successfully activated. See "Configuring Your Managed System" for more information.

Figure 3-15. Console Redirection Example

Rebooting the Managed System and Activating Console Redirection

Select option 4 in the main menu.

NOTE: You must be connected to the managed system's BMC before you can configure the SOL features. If SOL Proxy is not yet connected to the managed system's BMC, you are prompted for an IP address and a username/password combination. See "Connecting to the Remote Managed System's BMC" for more information.

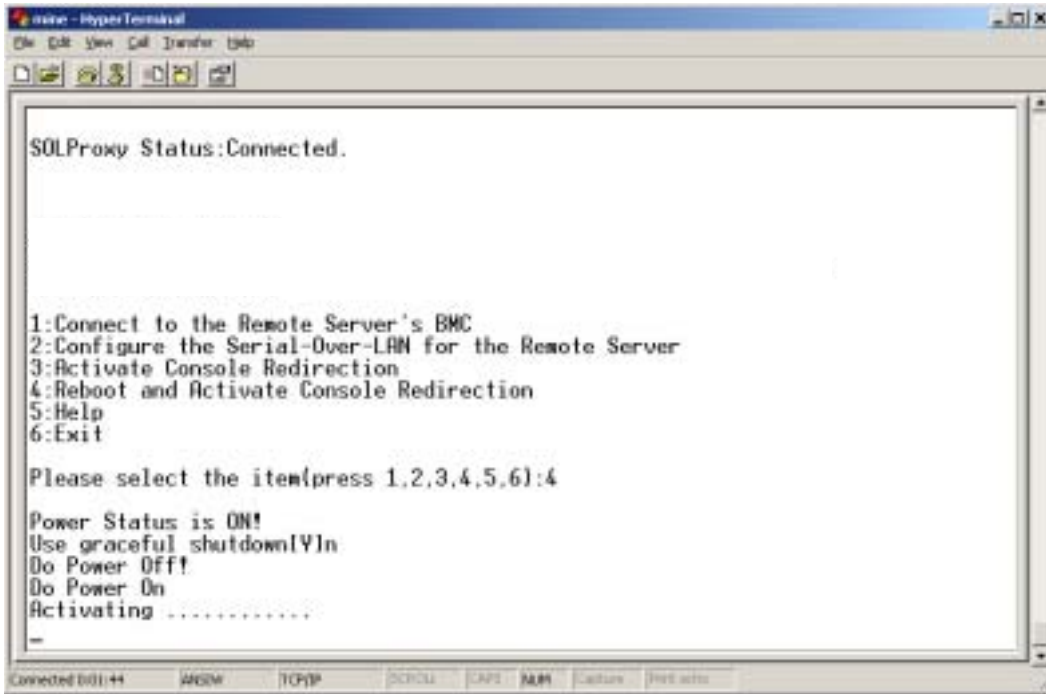
The power state of the remote managed system is confirmed. If power is on, you are asked to decide between a graceful or forceful shutdown.

Next, the power state is monitored until the status changes to off. Console redirection begins, and the remote managed system text console is redirected to your management station. Use the escape character sequence <~><. > to terminate console redirection and return to the top-level menu.

While the managed system reboots, you can enter the BIOS system setup program to view or configure BIOS settings. See Figure 3-16.

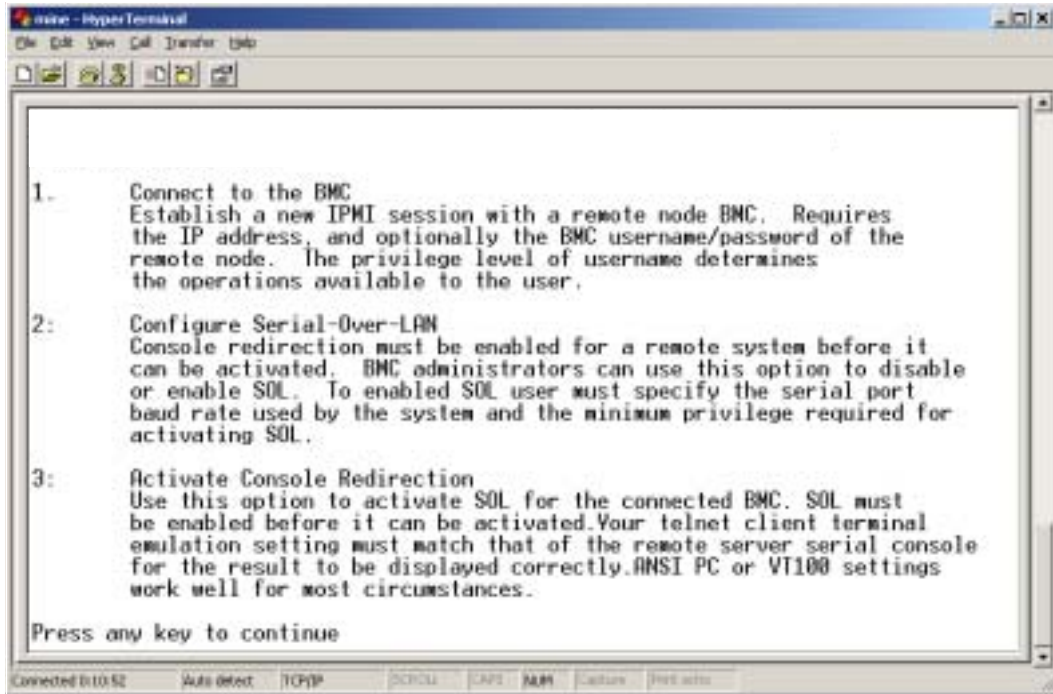
NOTE: Before activating the console redirection, you must first enable the console redirection features. See "Configuring Your Managed System" for more information.

Figure 3-16. Reboot Example



Getting Help

Select option 5 in the main menu to display detailed descriptions for each option. See Figure 3-17.

Figure 3-17. Sample Help Screen**Exit**

Select option 6 to end your telnet session and disconnect from SOL Proxy.

Configuring SOL Proxy with the SOL Proxy Configuration File

SOL Proxy must be correctly configured and running before you can establish a telnet connection.

There are certain SOL parameters that the user can set by modifying the `solproxy.cfg` file. The parameters and their descriptions are as follows:

Comments

Any line starting with a “#” is treated as a comment. For example:

```
#The file is an example.
```

IP address

`ip` — Specifies the specific IP address used to connect to SOL Proxy. This item defines what kind of connection can be accepted to establish a SOL Proxy telnet session. There are three possible values:

- **INADDR_ANY** — SOL Proxy accepts the telnet request to any system.
- **127.0.0.1** — SOL Proxy accepts the telnet request to the localhost.
- **IP address** — SOL Proxy accepts the telnet request to the specified IP address.

For example:

```
ip=INADDR_ANY
```

Port binding

port — Specifies the port at which the SOL Proxy listens for incoming connections. By default, the port is set to 623 and can be modified by the user.

This item defines the port when you telnet SOL Proxy. If this item is absent, 623 is set as the default port. For example:

```
port=623
```

Session Timeout

session_timeout — Specifies the time in minutes before the SOL Proxy session times out.

If there is no keyboard activity for the specified timeout period, the telnet session and the SOL session will be closed. The timeout value is specified in minutes and can be changed during SOL Proxy installation. For example:

```
session_timeout=30
```

Power-off Timeout

power_off_timeout — Specifies the time in seconds before the SOL Proxy gives up polling for the managed system's power status. If the SOL Proxy issues the power off command and the system does not power off within the specified interval, the SOL Proxy returns with a message, indicating that the SOL Proxy was unable to power off the system due to the timeout interval.



NOTE: When **Reboot and Activate Console Redirection** is selected and power for the remote managed system is on, a **power off IPMI** command is issued. The power status is then continually monitored until the power status reports "off." If power status remains "on" longer than this timeout period, **Reboot and Activate Console Redirection** reports an error and returns to the top-level menu. This timeout value is specified in seconds and can be changed during SOL Proxy installation.

For example:

```
power_off_timeout=60
```

Retry Interval

retry_interval — Specifies the period of time in seconds that the BMC waits before it tries to resend a packet. The **retry_interval** unit is half a second. Therefore, a value of 2 means that the software waits one second for the BMC to respond before it tries to resend the packet, a value of 4 means that it waits two seconds, and so on. For example:

```
retry_interval=2
```

Retry Count

retry_count — Specifies the maximum number of times that the software tries to resend a packet if it does not receive a response from the BMC. Before each retry, the software waits for the interval specified by the **retry_interval** parameter. For example:

```
retry_count=10
```

Known Issues and Frequently Asked Questions

This section discusses known issues with using the BMC Management Utility, along with frequently asked questions.

Known Issues

General Issues

- You must assign a valid BMC user name and password before you can connect to your system's BMC using the BMC Management Utility. Even though your system's BMC firmware does not allow null user names or null passwords to be set, the BMC Management Utility does not limit this functionality. If you do not explicitly provide a valid BMC user name and password when using the BMC Management Utility to log in to your system's BMC, the BMC firmware will use a null user name and null password as defaults, resulting in a "Login Not Authorized" error.

SOL Proxy Issues

- SOL Proxy on IP port 623 allows connections from a Web browser. However, if you connect from a Web browser, SOL Proxy displays only jumbled and unusable data. You must close the Web session and connect through a telnet connection to run the application.
- Only one telnet session at a time can be connected to the SOL Proxy service.
- Microsoft® SAC does not implement hardware control flow. Therefore, when console redirection is enabled with EMS SAC, you will see corrupted data. Because SAC does not implement hardware flow control, you are not able to effectively use SOL Proxy to activate console redirection to EMS SAC.

IPMI Shell Issues

- After IPMI Shell is installed, if you open a command prompt and type "ipmish" without being in the "C:\Program Files\Dell\SysMgt\bmc" directory you will get an error saying that the command could not be found. This is because by default, the IPMISH directory is not added to the system path. You must either manually add the system path to the command line, or go to the specified directory before running the IPMISH application.

Frequently Asked Questions

Q: Do IPMI Shell commands correspond one-to-one to IPMI commands?

A: IPMI Shell provides only the most useful IPMI commands. It includes a definitive set of commands that can accomplish the most common management tasks. Therefore, IPMI Shell commands may not correspond one-to-one to IPMI commands.

Q: Can I manage a system by accessing multiple IPMI instances simultaneously?

A: Yes, you can manage a system by accessing multiple IPMI instances at the same time as long as your system's BMC supports more than one concurrent connection.

Q: Can I manage a system by accessing multiple SOL Proxy connections simultaneously?

A: No, a system can have only one SOL Proxy connection at any time. This connection is established when you choose either option **3** or **4** in the main menu. However, if you select option **1** to connect to the remote system, only an IPMI connection is established. In this case, multiple clients can simultaneously use option **1** in the SOL proxy main menu to connect to the same system. (See the previous question.)

Q: How do I unlock an SOL session occupied by another user?

A: Your system's BMC only supports one SOL session at a time. You must wait for the current user's session to time out before you can access a new SOL proxy session. See "Session Timeout" for more information about configuring the session timeout parameters.

Q: Why can't I enter the BIOS setup interface during the process of remote system rebooting?

A: When you select item **4, Reboot and activate console redirection**, in the **SOL Proxy** main menu, the managed system is rebooted first. Press <F2> to enter the BIOS setup interface, if the telnet client you are using supports VT100 or ANSI.

Q: Why can't I connect to a console using the terminal emulation software included with my Microsoft Windows operating system?

A: The version of HyperTerminal included with Windows does not provide many functions required during console redirection. Either upgrade to HyperTerminal Private Edition 6.1 or later, or select any other terminal emulation software that supports VT100 or ANSI emulation mode.

Q: I performed a **Reboot and Activate Console Redirection** command using SOL Proxy, but the option to press <F2> to enter the BIOS setup never appeared.

A: When the network switch has spanning-tree enabled, it takes about 30-40 seconds for the spanning-tree check to make sure there are no loops in the network. During this time, packet forwarding by the switch is blocked. Therefore, the software cannot communicate with the BMC until the spanning tree check is complete.

Disable spanning-tree on the network switch and try performing a **Reboot and Activate Console Redirection** command using SOL Proxy again. You should now be able to enter BIOS setup by pressing <F2>.

Q: Why do some key and key combinations such as <F10> and <Ctrl><Alt> not work during console redirection?

A: Console redirection uses ANSI or VT 100/220 terminal emulation, which is limited to basic ASCII characters. Function keys, arrow keys, and control keys are not available in the ASCII character set, and most utilities require function keys and control keys for ordinary operations. See your system *User's Guide* for instructions about how to emulate certain function keys and control keys by using special key sequences, called escape sequences, to represent the specific, nonfunctioning keys.

Q: Can you use terminal mode simultaneously with BIOS console redirection?

A: Yes. BMC terminal mode can function simultaneously with BIOS console redirection. You can "escape" between the BMC's terminal mode and the BIOS console redirection using the following Escape sequences:

Press <Esc><q> to switch the system serial port to the BIOS console redirection text stream.

Press <Esc><(to switch the system serial port to the BMC terminal mode text stream.



NOTE: Because you are switching back and forth between two independently active text streams, data may be lost.

See your system *User's Guide* for more information about configuring and using BIOS console redirection and see "Terminal Mode Commands" for more information about using Terminal Mode commands.

BMC Management Utility Error Codes

This appendix provides a list of error messages for the BMC Management Utility. In case of a functional failure, an error message will be printed to `stderr`. The text of the error message is listed in the **Message** column in Table A-1.

Errors will always be printed in a parsable format such as:

```
Error (<hex-code>) : <message> !
```

The following is an example:

```
Error(0xC1) : Invalid Command!
```

Table A-1. BMC Management Utility Error Codes

Code	Classification	Message	Description	IPMI Error
A1h	Connection errors.	Connection timeout.	BMC not responding.	
		Invalid authentication type.	Authentication type error.	
A2h	Communication errors.	Communication error.	Network stack or serial communication error.	
		Data error.	Data packet format error.	0xC6, 0xC7, 0xC8, 0xCA
		Not connected.	Not connected to a remote server yet.	
A3h	Authorization errors.	Insufficient privilege for command.	Insufficient privilege level to execute command.	0xD4
		Login not authorized.	Invalid BMC username/password.	0x86
A5h BDh	Initialization errors.	Authentication failure.	Request for a session from the local or remote proxy was rejected.	

Table A-1. BMC Management Utility Error Codes (continued)

Code	Classification	Message	Description	IPMI Error
		Access denied.	Trying to access the proxy from a forbidden IP address.	
		Unknown language.	Unknown language code.	
		Invalid IP address.	IP resolving error.	
		Session buffer limit exceeded.	Length exceeds the limit of telnet input.	
A6h A8h	Syntax errors.	Command syntax error.	Unable to parse command.	
		Unrecognized command.	Unrecognized command.	
		Conflicting option.	Conflicting option (-last and -max).	
		Invalid parameter.	Invalid parameter.	
A7h	Parameter value errors.	Parameter out of range.	Parameter out of range.	0xC9
		Parameter out of range (1-255).	The value is out of range (1-255).	
		Parameter out of range(1-65535)	The value is out of range (1-65535).	
		Invalid data field.	Invalid data field.	0xCC
		Invalid index value.	Index cannot be zero or a negative number.	
		First index larger than the last.	The first index is larger than the last.	
		First index larger than total SEL records.	The first index is larger than the total SEL records.	
A8h	H/W or F/W errors.	Unsupported command.	Unsupported operation.	0xC1
		Sensor not present.	Request sensor, data, or record not present.	0xCB
		Sensor command error.	Command illegal for specified sensor or record type.	0xCD

Table A-1. BMC Management Utility Error Codes (continued)

Code	Classification	Message	Description	IPMI Error
		Firmware error.	Command response could not be provided.	0xCE
		Destination error.	Cannot deliver request to destination.	0xD3
		Device error.	Device specific (OEM) errors.	0x01–0x7E
A9h	Processing errors (transient errors that may disappear upon retry of command).	BMC busy.	BMC out of processing resources.	0xC0
		Destination timeout error.	BMC timeout while processing command	0xC3
		BMC out of storage space.	BMC out of storage space required to process command.	0xC4
		Invalid reservation ID.	Invalid reservation ID.	0xC5
		Duplicate command.	Cannot execute duplicated request.	0xCF
		SDR busy.	Sensor Data Record Repository in update mode.	0xD0
		Device busy.	Device in firmware update mode.	0xD1
		BMC unavailable.	BMC initialization in progress.	0xD2
		Bad BMC state.	Request not supported in present BMC state.	0xD5
		BMC out of sessions.	No session slots are available for connection request.	0x81, 0x82, 0x83
AEh	Unexpected IPMI errors.	Invalid LUN.	Invalid Logical Unit Number (LUN) in request.	0xC2
		Unspecified error.	Unspecified error.	0xFF
AFh	Unknown error	Unknown error.	Unknown error.	

Terminal Mode Commands

This appendix provides information about terminal mode commands. Terminal mode allows you to directly connect to the system's Baseboard Management Controller (BMC) using a serial port connection and execute text-based commands. Two types of text commands are supported:

- A limited selection of text commands
- Standard binary IPMI 1.5 hex-ASCII commands

Use the Terminal Mode feature to perform the following tasks:

- Power the server on or off.
- Reset the server.
- Retrieve the server's health status.
- Configure and retrieve the server management subsystems boot options.
- Configure and retrieve the BMC's terminal mode configuration.
- Execute any platform supported binary command specified in the Intelligent Platform Management Interface (IPMI) version 1.5 specification using the hex-ASCII format.



NOTE: Many of the Terminal Mode features described in this section require an extensive knowledge of IPMI. It is strongly recommended that Terminal Mode users have an advanced understanding of IPMI before using the commands documented in this section.

Security Information

Access to the BMC using terminal mode is governed by the proper setup of user names and password. See "Configuring Your Managed System" for more information. A session must be established with the BMC prior to accepting any terminal mode commands. A limited selection of text commands and binary hex-ASCII commands that are assigned the lowest IPMI privilege level are available prior to session establishment with the BMC.

Since the terminal mode password is sent using clear text, it is highly desirable that the terminal mode session takes place in a secure location over a secure link by using a direct connection.

Syntax

Terminal mode messages follow the general syntax below:

```
[ <message data> ] <newline sequence>
```

Each terminal mode message must be preceded with the left bracket "start" character and must be ended with a right bracket "stop" character and the appropriate input new-line sequence.

No input characters are accepted until the start character has been received.



NOTE: Hex-ASCII commands can either use upper or lower-case letters for ASCII representations of hex digits.

Command Length

Terminal mode messages are limited to a maximum length of 122 characters. This includes the left- and right-brackets, but not control characters.

Character Support

Terminal mode messages are composed of standard printable ASCII characters. All other characters are treated as illegal characters.

Special Character Handling — <ESC> character

The <ESC> character deletes an entire message prior to submission to the BMC for processing. If line editing is enabled, and the <ESC> key is followed by an input newline sequence, the BMC responds by outputting an output newline sequence. Otherwise, the BMC looks for the next start character.

Special Character Handling — or <BKSP> character

The <BKSP> or key deletes the last character entered if the message has not been submitted to the BMC yet.

Special Character Handling — Line Continuation character

Long IPMI messages can be split across multiple lines by using the line continuation <BACKSLASH> character followed immediately by an input newline sequence. Line continuation character usage is supported for both text and hex-ASCII commands.

Special Character Handling — Illegal characters

Any illegal characters received by the BMC clear the message in progress and the BMC looks for the next start character.

Hex-ASCII Command Format

Binary IPMI commands are sent and received as a series of case-insensitive hex-ASCII pairs, where each is separated from the preceding pair by a single <space> character. Table B-1 lists the terminal mode requests to BMC and Table B-2 lists the terminal mode responses from BMC. The following is an example of a binary IPMI request message:

```
[18 00 22]<newline sequence>
```

Table B-1. Terminal Mode Request to BMC

Byte	Explanation
1	[7:2] – Net Function (even) [1:0] – Responder’s LUN
2	[7:2] – Requester’s Sequence Number [1:0] – Bridge field
3	Command Number
4:N	Data

Table B-2. Terminal Mode Response from BMC

Byte	Explanation
1	[7:2] – Net Function (odd) [1:0] – Responder’s LUN
2	[7:2] – Requester’s Sequence Number [1:0] – Bridge field
3	Command Number
4	Completion Code
5:N	Data

Text Command Format

Text commands do not support the bridging and sequence number fields present in the hex-ASCII commands. In addition, text commands are preceded by a prefix consisting of the string *SYS*. Table B-3 lists the terminal mode text commands and Table B-4 lists the terminal mode configuration.

Examples

Hex-ASCII command example (IPMI Reset Watchdog Cmd):

```
[18 00 22]<CR>
```

```
[1C 00 22 00]<CR-LF>
```

Text command example:

```
[SYS TMODE]<CR>
```

```
[OK TMODE]<CR-LF>
```

Table B-3. Terminal Mode Text Commands

Command	Switches	Description
SYS PWD	-U USERNAME <password>	-U activates a terminal mode session. USERNAME corresponds to the ASCII text for the username. <password> represents a printable password (up to 16 characters). If <password> is not provided, then a Null password (all binary 0's) is submitted. Passwords are case sensitive. Either the SYS PWD command or the Activate Session IPMI message must be successfully executed before any command or IPMI messages are accepted. NOTE: A modem connection may be automatically dropped if multiple bad passwords are entered.
	-N <password>	-N represents a Null username and <password> represents a printable password (up to 16 characters). If <password> is not provided, then a Null password (all binary 0's) is submitted. Passwords are case sensitive. Either the SYS PWD command or the Activate Session IPMI message must be successfully executed before any command or IPMI messages are accepted. NOTE: A modem connection may be automatically dropped if multiple bad passwords are entered.
	-X	-X immediately logs out any presently active session. NOTE: Entering an invalid password with -U or -N does not allow you to log on.
SYS TMODE		Used as a no-op confirm that Terminal Mode is active. The BMC returns an OK response followed by TMODE.

Table B-3. Terminal Mode Text Commands (continued)

Command	Switches	Description
SYS SET BOOT XX YY ZZ AA BB		<p>Sets the boot flags to direct a boot to the specified device following the next IPMI command or action initiated reset or power-on. XX...BB represent five hex-ASCII encoded bytes, which are the boot flags parameter in the Boot Option Parameters.</p> <p>Upon receiving this command, the BMC automatically sets the valid bit in the boot options and sets all the Boot Initiator Acknowledge data bits to 1b.</p>
SYS SET BOOTOPT XX YY...NN		<p>This is a text version of the IPMI Set System Boot Options command. It allows any of the boot option parameters to be set, not just the boot flags. XXYY...NN represent the hex-ASCII encoding for the data bytes that are passed in the Set System Boot Options request.</p> <p>XX — Parameter valid.</p> <p>[7] — 1b = Mark parameter invalid / locked. 0b = Mark parameter valid / unlocked.</p> <p>[6:0] — Boot option parameter selector .</p> <p>YY...NN — Boot Option Parameter Data.</p> <p>Passing 0-bytes of parameter data allows the parameter valid bit to be changed without affecting the present parameter setting.</p>

Table B-3. Terminal Mode Text Commands (continued)

Command	Switches	Description
SYS GET BOOTOPT XX YY ZZ		<p>This is a text version of the IPMI Get System Boot Options command. It allows any of the boot option parameters to be retrieved.</p> <p>XX YY ZZ represents the hex-ASCII for the data bytes that are passed in the Get System Boot Options request.</p> <p>The BMC returns the data from the command in hex-ASCII format.</p> <p>XX—Parameter selector.</p> <p>[7]—Reserved.</p> <p>[6:0]—Boot option parameter selector.</p> <p>YY—Set Selector.</p> <p>[7:0]—Selects a particular block or set of parameters under the given parameter selector.</p> <p>Write as 00h if the parameter does not use a Set Selector.</p> <p>ZZ—Block Selector.</p> <p>Selects a particular block within a set of parameters</p> <p>Write as 00h if the parameter does not use a Block Selector.</p> <p>NOTE: There are no IPMI-specified Boot Options parameters that use the block selector. However, this field is provided for consistency with other configuration commands and as a placeholder for future extension of the IPMI specification.</p>
SYS SET TCFG		<p>Returns the Terminal Mode Configuration bytes where XX and YY represent hex-ASCII encoding for the volatile version of data bytes 1 and 2 as specified in Table B-4, and AA BB represent hex-ASCII encoding of the non-volatile version.</p> <p>V:XX <output termination sequence></p> <p>N:AA BB <output termination sequence></p>
	-V XX YY	Sets the volatile Terminal Mode Configuration. XX and YY represent hex-ASCII encoding for data bytes 1 and 2 as specified in Table B-4. The BMC returns the same output as for SYS SET TCFG, above.
	-N XX YY	Sets the non-volatile Terminal Mode Configuration. XX and YY represent hex-ASCII encoding for data bytes 1 and 2 as specified in Table B-4. The BMC returns the same output as for SYS SET TCFG, above.
SYS RESET		Directs the BMC to perform an immediate system hard reset.

Table B-3. Terminal Mode Text Commands (continued)

Command	Switches	Description
SYS POWER OFF		Directs the BMC to perform an immediate system power off.
SYS POWER ON		Causes the BMC to initiate an immediate system power on.
SYS HEALTH QUERY		<p>Causes the BMC to return a high level version of the system health status in "terse" format. The BMC returns a string with the following format if the command is accepted.</p> <pre>PWR:zzz H:xx T:xx V:xx PS:xx C:xx D:xx S:xx O:xx</pre> <p>Where:</p> <ul style="list-style-type: none">PWR is system POWER state.H is overall Health.T is Temperature.V is Voltage.PS is Power Supply subsystem.C is cooling subsystem (Fans).D is Hard Drive / RAID Subsystem.S is physical Security.O is Other (OEM). <p>zzz is: ON, OFF (soft-off or mechanical off), SLP (sleep - used when sleep level cannot be distinguished), S4, S3, S2, S1, ?? (unknown).</p> <p>and xx is: ok, nc, cr, nr, uf, or ?? where:</p> <ul style="list-style-type: none">ok = OK (monitored parameters within normal operating ranges).nc = non-critical ("warning": hardware outside normal operating range).cr = critical ("fatal": hardware exceeding specified ratings).nr = non-recoverable ("potential damage": system hardware in jeopardy or damaged).uf = unspecified fault (fault detected, but severity unspecified).?? = status not available/unknown (typically because system power is OFF).

Table B-3. Terminal Mode Text Commands (continued)

Command	Switches	Description
SYS HEALTH QUERY	-V	<p>Causes the BMC to return a high level version of the system health status in multi-line "verbose" format. The BMC returns a string of the following format:</p> <p>SYS Health:xx<output termination sequence>. Power: ON, OFF (soft-off or mechanical off), SLEEP (sleep - used when can't distinguish sleep level), S4, S3, S2, S1, Unknown. Temperature:xx<output termination sequence>. Voltage:xx<output termination sequence>. PowerSystem:xx<output termination sequence>. Cooling:xx<output termination sequence>. Drives:xx<output termination sequence>. Security:xx<output termination sequence>. Other:xx<output termination sequence>.</p> <p>Where xx is:</p> <p>OK (monitored parameters within normal operating ranges). Non-critical ("warning": hardware outside normal operating range). Critical ("fatal" :hardware exceeding specified ratings). Non-recoverable ("potential damage": system hardware in jeopardy or damaged). Unspecified fault (fault detected, but severity unspecified). Unknown (status not available/unknown (typically because system power is OFF)).</p>

Table B-4. Terminal Mode Configuration

Byte	Explanation
1	<p>[7:6]—Reserved.</p> <p>[5]—Line Editing.</p> <p>0b = Disable.</p> <p>1b = Enable (Factory default).</p> <p>[4]—Reserved.</p> <p>[3:2]—Delete control (only applies when line editing is enabled).</p> <p>00b = BMC outputs a character when <BKSP> or is received.</p> <p>01b = BMC outputs a < BKSP >< SP >< BKSP > sequence when < BKSP > or < DEL > is received (Factory default).</p> <p>[1]—Echo control 0b = No echo 1b = Echo (BMC echoes characters it receives) (Factory default).</p> <p>[0]—Handshaking—BMC outputs a [SYS]<newline> after receiving each terminal mode IPMI message and is ready to accept the next message.</p> <p>0b = Disable.</p> <p>1b = Enable (Factory default).</p>
2	<p>[7:4] - Output newline sequence (BMC to console). Selects what characters the BMC uses as the <newline> sequence when the BMC writes a line to the console in Terminal Mode.</p> <p>0h = no termination sequence.</p> <p>1h = <CR-LF> (Factory default)</p> <p>2h = <NULL></p> <p>3h = <CR></p> <p>4h = <LF-CR></p> <p>5h = <LF></p> <p>All other = reserved</p> <p>[3:0] - Input newline sequence (Console to BMC). Selects what characters the console uses as the <newline> sequence when writing to the BMC in Terminal Mode.</p> <p>0h = reserved</p> <p>1h = <CR> (Factory default)</p> <p>2h = <NULL></p> <p>All other = reserved</p>

Glossary

The following list defines or identifies technical terms, abbreviations, and acronyms used in your system documents.

adapter card

An expansion card that plugs into an expansion-card connector on the system's system board. An adapter card adds some specialized function to the system by providing an interface between the expansion bus and a peripheral device. Examples of adapter cards include network cards, sound cards, and SCSI adapters.

ANSI

Abbreviation for American National Standards Institute.

API

Abbreviation for application program interface, which is a set of routines, protocols, and tools for building software applications that act as an interface between the operating system and application programs.

Argument

The value supplied with an option, such as in the following command line instance:

```
utilname --option=argument
```

ARP

Acronym for Address Resolution Protocol, which is a method for finding a host's Ethernet address from its Internet address.

ASCII

Acronym for American Standard Code for Information Interchange. A text file containing only characters from the ASCII character set (usually created with a text editor, such as Notepad in Microsoft® Windows®), is called an ASCII file.

asset tag code

An individual code assigned to a system, usually by a system administrator, for security or tracking purposes.

autoexec.bat file

The **autoexec.bat** file is executed when you boot your system (after executing any commands in the **config.sys** file). This start-up file contains commands that define the characteristics of each device connected to your system, and it finds and executes programs stored in locations other than the active directory.

backup

A copy of a program or data file. As a precaution, you should back up your system's hard drive on a regular basis. Before making a change to the configuration of your system, you should back up important start-up files from your operating system.

baud rate

A measurement of data transmission speed. For example, modems are designed to transmit data at one or more specified baud rate(s) through the COM (serial) port of a system.

binary

A base-2 numbering system that uses 0 and 1 to represent information. The system performs operations based on the ordering and calculation of these numbers.

BIOS

Acronym for basic input/output system. Your system's BIOS contains programs stored on a flash memory chip. The BIOS controls the following:

- Communications between the microprocessor and peripheral devices, such as the keyboard and the video adapter
- Miscellaneous functions, such as system messages

bit

The smallest unit of information interpreted by your system.

BMC

Abbreviation for baseboard management controller, which is a controller that provides the intelligence in the IPMI structure.

boot routine

When you start your system, it clears all memory, initializes devices, and loads the operating system. Unless the operating system fails to respond, you can reboot (also called warm boot) your system by pressing <Ctrl> <Alt> ; otherwise, you must perform a cold boot by pressing the reset button or by turning the system off and then back on.

bootable diskette

You can start your system from a diskette. To make a bootable diskette on a system running Windows, insert a diskette in the diskette drive, type `sys a:` at the command line prompt, and press <Enter>. Use this bootable diskette if your system will not boot from the hard drive.

bus

An information pathway between the components of a system. Your system contains an expansion bus that allows the microprocessor to communicate with controllers for all the various peripheral devices connected to the system. Your system also contains an address bus and a data bus for communications between the microprocessor and RAM.

byte

Eight contiguous bits of information, the basic data unit used by your system.

cache

A fast storage area that keeps a copy of data or instructions for quicker data retrieval. For example, your system's BIOS may cache ROM code in faster RAM. Or, a disk-cache utility may reserve RAM in which to store frequently accessed information from your system's disk drives; when a program makes a request to a disk drive for data that is in the cache, the disk-cache utility can retrieve the data from RAM faster than from the disk drive.

CD-ROM

Abbreviation for compact disc read-only memory. CD drives use optical technology to read data from CDs. CDs are read-only storage devices; you cannot write new data to a CD with standard CD drives.

CHAP

Acronym for Challenge-Handshake Authentication Protocol, an authentication scheme used by PPP servers to validate the identity of the originator of the connection upon connection or any time later.

CLI

Abbreviation for command line interface.

Command

The combination of an option and argument or just an option if no argument is required, such as in the following command line instances:

```
utilname --option
```

```
utilname --option=argument
```

command line instance

A series of valid commands, options, and arguments typed in the command line. For example, the DTK utility name and all necessary options and arguments as they are entered through the OS shell:

```
A:>utilname --option --option=argument
```

COM*n*

The device names for the first through fourth serial ports on your system are COM1, COM2, COM3, and COM4. The default interrupt for COM1 and COM3 is IRQ4, and the default interrupt for COM2 and COM4 is IRQ3. Therefore, you must be careful when configuring software that runs a serial device so that you don't create an interrupt conflict.

config.sys file

The **config.sys** file is executed when you boot your system (before running any commands in the **autoexec.bat** file). This start-up file contains commands that specify which devices to install and which drivers to use. This file also contains commands that determine how the operating system uses memory and controls files.

console redirection

Console redirection is a function that directs a managed system's display screen, mouse functions, and keyboard functions to the corresponding devices on a management station. You may then use the management station's system console to control the managed system.

controller

A chip that controls the transfer of data between the microprocessor and memory or between the microprocessor and a peripheral device such as a disk drive or the keyboard.

control panel

The part of the system that contains indicators and controls, such as the power switch, hard drive access indicator, and power indicator.

conventional memory

The first 640 KB of RAM. Conventional memory is found in all systems. Unless they are specially designed, MS-DOS[®] programs are limited to running in conventional memory.

CPU

Abbreviation for central processing unit. See also microprocessor.

device driver

A program that allows the operating system or some other program to interface correctly with a peripheral device, such as a printer. Some device drivers—such as network drivers—must be loaded from the **config.sys** file (with a **device=** statement) or as memory-resident programs (usually, from the **autoexec.bat** file). Others—such as video drivers—must load when you start the program for which they were designed.

DHCP

Abbreviation for Dynamic Host Configuration Protocol, a protocol that provides a means to dynamically allocate IP addresses to computers on a LAN.

DIMM

Acronym for dual in-line memory module. A small circuit board containing DRAM chips that connects to the system board.

directory

Directories help keep related files organized on a disk in a hierarchical, "inverted tree" structure. Each disk has a "root" directory; for example, a **C:\>** prompt normally indicates that you are at the root directory of hard drive C. Additional directories that branch off of the root directory are called subdirectories. Subdirectories may contain additional directories branching off of them.

DKS

Abbreviation for dynamic kernel support.

DMA

Abbreviation for direct memory access. A DMA channel allows certain types of data transfer between RAM and a device to bypass the microprocessor.

DRAC II

Acronym for Dell OpenManage™ Remote Assistant Card, version 2.

DRAC III

Acronym for Dell™ Remote Access Card III.

DRAC III/XT

Acronym for Dell Remote Access Card III/XT.

DRAM

Acronym for dynamic random-access memory. A system's RAM is usually made up entirely of DRAM chips. Because DRAM chips cannot store an electrical charge indefinitely, your system continually refreshes each DRAM chip in the system.

EEPROM

Acronym for electrically erasable programmable read-only memory.

EIDE

Abbreviation for enhanced integrated drive electronics. EIDE devices add one or more of the following enhancements to the traditional IDE standard:

- Data transfer rates of up to 16 MB/sec
- Support for drives other than just hard drives, such as CD and tape drives
- Support for hard drives with capacities greater than 528 MB
- Support for up to two controllers, each with up to two devices attached

EMM

Abbreviation for expanded memory manager. A utility that uses extended memory to emulate expanded memory on systems with an Intel386™ or higher microprocessor.

EMS

Abbreviation for Expanded Memory Specification.

EPROM

Acronym for erasable programmable read-only memory.

ERA

Abbreviation for embedded remote access.

ERA/MC

Abbreviation for embedded remote access modular computer. See modular system.

ERA/O

Abbreviation for embedded remote access option.

ESM

Abbreviation for embedded systems management, which is a set of instruction coding in system software and firmware that notifies a user about potential hardware problems on a system.

expanded memory

A technique for accessing RAM above 1 MB. To enable expanded memory on your system, you must use an EMM. You should configure your system to support expanded memory only if you run application programs that can use (or require) expanded memory.

extended memory

RAM above 1 MB. Most software that can use it, such as the Windows operating system, requires that extended memory be under the control of an XMM.

external cache memory

A RAM cache using SRAM chips. Because SRAM chips operate at several times the speed of DRAM chips, the microprocessor can retrieve data and instructions faster from external cache memory than from RAM.

FAT

Acronym for file allocation table. FAT and FAT32 are file systems that are defined as follows:

- **FAT** — A file system used by MS-DOS, Windows 3.x, Windows 95, and Windows 98. Windows NT® and Windows 2000 also can use the

FAT file system. The operating system maintains a table to keep track of the status of various segments of disk space used for file storage.

- **FAT32** — A derivative of the FAT file system. FAT32 supports smaller cluster sizes than FAT, thus providing more efficient space allocation on FAT32 drives.

FEPRM

Acronym for flash erasable programmable read-only memory. Flash memory is a kind of nonvolatile storage device similar to EEPROM, but the erasing is done only in blocks or the entire chip.

firmware

Software (programs or data) that has been written onto read-only memory (ROM). Firmware can boot and operate a device. Each controller contains firmware which helps provide the controller's functionality.

flash bios

A BIOS that is stored in flash memory rather than in ROM. A flash BIOS chip can be updated in place, whereas a ROM BIOS must be replaced with a newer chip.

flash memory

A type of EEPROM chip that can be reprogrammed from a utility on diskette while still installed in a system; most EEPROM chips can only be rewritten with special programming equipment.

format

To prepare a hard drive or diskette for storing files. An unconditional format deletes all data stored on the disk.

FRU

Abbreviation for field replaceable unit, which identifies a module or component that will typically be replaced in its entirety as part of a field service repair operation.

function commands

Commands that specify an action to be performed.

GB

Abbreviation for gigabyte(s). A gigabyte equals 1024 megabytes or 1,073,741,824 bytes.

graphics mode

A video mode that can be defined as x horizontal by y vertical pixels by z colors.

GUI

Acronym for graphical user interface.

GUID

Abbreviation for Globally Unique Identifier, which is a random number used in software applications. Each generated GUID is supposed to be unique.

h

Abbreviation for hexadecimal. A base-16 numbering system, often used in programming to identify addresses in the system's RAM and I/O memory addresses for devices. The sequence of decimal numbers from 0 through 16, for example, is expressed in hexadecimal notation as: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, 10. In text, hexadecimal numbers are often followed by h.

HBA

Abbreviation for host bus adapter. A PCI adapter card that resides in the system whose only function is to convert data commands from PCI-bus format to storage interconnect format (examples: SCSI, Fibre Channel) and communicate directly with hard drives, tape drives, CD drives, or other storage devices.

HMA

Abbreviation for high memory area. The first 64 KB of extended memory above 1 MB. A memory manager that conforms to the XMS can make the HMA a direct extension of conventional memory. Also see XMM.

host adapter

A host adapter implements communication between the system's bus and the controller for a peripheral device. (hard drive controller subsystems include

integrated host adapter circuitry.) To add a SCSI expansion bus to your system, you must install or connect the appropriate host adapter.

HPFS

Abbreviation for the High Performance File System option in the Windows NT operating systems.

HTTP

Abbreviation for Hypertext Transfer Protocol. HTTP is the client-server TCP/IP protocol used on the World Wide Web for the exchange of HTML documents.

HTTPS

Abbreviation for HyperText Transmission Protocol, Secure. HTTPS is a variant of HTTP used by Web browsers for handling secure transactions. HTTPS is a unique protocol that is simply SSL underneath HTTP. You need to use "https://" for HTTP URLs with SSL, whereas you continue to use "http://" for HTTP URLs without SSL.

ID

Abbreviation for identifier, commonly used when referring to a user identifier (user ID), object identifier (object ID), or hardware identifier (controller ID).

IDE

Abbreviation for Integrated Drive Electronics. IDE is a computer system interface, used primarily for hard drives and CDs.

I/O

Abbreviation for input/output. The keyboard is an input device, and a printer is an output device. In general, I/O activity can be differentiated from computational activity. For example, when a program sends a document to the printer, it is engaging in output activity; when the program sorts a list of terms, it is engaging in computational activity.

internal microprocessor cache

An instruction and data cache built in to the microprocessor. The Intel® Pentium® microprocessor

includes a 16-KB internal cache, which is set up as an 8-KB read-only instruction cache and an 8-KB read/write data cache.

IP address

Abbreviation for Internet Protocol address. See TCP/IP.

IPMI

Abbreviation for Intelligent Platform Management Interface, which is an industry standard for management of peripherals used in enterprise systems based on Intel® architecture. The key characteristic of IPMI is that inventory, monitoring, logging, and recovery control functions are available independent of the main processors, BIOS, and operating system.

IRQ

Abbreviation for interrupt request. A signal that data is about to be sent to or received by a peripheral device travels by an IRQ line to the microprocessor. Each peripheral connection must be assigned an IRQ number. For example, the first serial port in your system (COM1) is assigned to IRQ4 by default. Two devices can share the same IRQ assignment, but you cannot operate both devices simultaneously.

KB

Abbreviation for kilobyte(s), 1024 bytes.

key combination

A command requiring you to press multiple keys at the same time. For example, you can reboot your system by pressing the <Ctrl><Alt> key combination.

LAN

Acronym for local area network. A LAN system is usually confined to the same building or a few nearby buildings, with all equipment linked by wiring dedicated specifically to the LAN.

local bus

On a system with local-bus expansion capability, certain peripheral devices (such as the video adapter circuitry) can be designed to run much faster than they would with a traditional expansion bus. Some local-bus designs allow peripherals to run at the same speed and with the same width data path as the system's microprocessor.

LPT n

The device names for the first through third parallel printer ports on your system are LPT1, LPT2, and LPT3.

LRA

Abbreviation for local response agent.

MB

Abbreviation for megabyte(s). The term megabyte means 1,048,576 bytes; however, when referring to hard drive storage, the term is often rounded to mean 1,000,000 bytes.

memory

A system can contain several different forms of memory, such as RAM, ROM, and video memory. Frequently, the word memory is used as a synonym for RAM; for example, an unqualified statement such as "a system with 16 MB of memory" refers to a system with 16 MB of RAM.

memory address

A specific location, usually expressed as a hexadecimal number, in the system's RAM.

memory manager

A utility that controls the implementation of memory in addition to conventional memory, such as extended or expanded memory.

memory module

A small circuit board containing DRAM chips that connects to the system board.

MHz

Abbreviation for megahertz.

microprocessor

The primary computational chip inside the system that controls the interpretation and execution of arithmetic and logic functions. Software written for one microprocessor must usually be revised to run on another microprocessor. CPU is a synonym for microprocessor.

modem

A device that allows your system to communicate with other systems over telephone lines.

modular system

A system that can include multiple server modules. Each server module functions as an individual system. To function as a system, a server module is inserted into a chassis which includes power supplies, fans, a system management module, and at least one network switch module. The power supplies, fans, system management module, and network switch module are shared resources of the server modules in the chassis. See server module.

MS-DOS

Acronym for Microsoft Disk Operating System.

NIC

Acronym for network interface controller.

NTFS

Abbreviation for the Windows NT File System option in the Windows NT operating system. NTFS is an advanced file system designed for use specifically within the Windows NT operating system. It supports file system recovery, extremely large storage media, and long file names. It also supports object-oriented applications by treating all files as objects with user-defined and system-defined attributes. See also FAT and FAT32.

NVRAM

Acronym for nonvolatile random-access memory. Memory that does not lose its contents when you turn off your system. NVRAM is used for maintaining the date, time, and system configuration information.

option

An argument to a command that modifies its function rather than providing data and is usually set off by a delimiter such as - or /. Some options may or must be followed by a value, for example:

```
utilname -option=argument
```

parameter

A value or option that you specify to a program. A parameter is sometimes called a switch or an argument.

partition

You can divide a hard drive into multiple physical sections called partitions with the fdisk command. Each partition can contain multiple logical drives. After partitioning the hard drive, you must format each logical drive with the format command.

PCI

Abbreviation for Peripheral Component Interconnect. The predominant 32-bit or 64-bit local-bus standard developed by Intel Corporation.

PCMCIA

Personal Computer Memory Card International Association. An international trade association that has developed standards for devices, such as modems and external hard drives, that can be plugged into portable computers.

PERC

Acronym for Expandable RAID controller.

peripheral device

An internal or external device—such as a printer, a disk drive, or a keyboard—connected to a system.

Plug and Play

An industry-standard specification that makes it easier to add hardware devices to personal computers. Plug and Play provides automatic installation and configuration, compatibility with existing hardware, and dynamic support of mobile computing environments.

POST

Acronym for power-on self-test. Before the operating system loads when you turn on your system, the POST tests various system components such as RAM, the disk drives, and the keyboard.

pre-operating system environment

A shell environment, such as DOS, used to configure system hardware before a major operating system, such as Microsoft Windows or Red Hat® Enterprise Linux, is installed.

program diskette set

The set of diskettes from which you can perform a complete installation of an operating system or application program. When you reconfigure a program, you often need its program diskette set.

PXE

Abbreviation for Pre-boot eXecution Environment.

RAC

Acronym for remote access controller.

RAID

Acronym for redundant array of independent drives.

RAM

Acronym for random-access memory. A system's primary temporary storage area for program instructions and data. Each location in RAM is identified by a number called a memory address. Any information stored in RAM is lost when you turn off your system.

RAM disk

A memory-resident program that emulates a hard drive.

read-only file

A read-only file is one that you are prohibited from editing or deleting. A file can have read-only status if:

- Its read-only attribute is enabled.
- It resides on a physically write-protected diskette or on a diskette in a write-protected drive.
- It is located on a network in a directory to which the system administrator has assigned read-only rights to you.

readme file

A text file included with a software package or hardware product that contains information supplementing or updating the documentation for the software or hardware. Typically, readme files provide installation information, describe new product enhancements or corrections that have not yet been documented, and list known problems or other things you need to be aware of as you use the software or hardware.

ROM

Acronym for read-only memory. Your system contains some programs essential to its operation in ROM code. Unlike RAM, a ROM chip retains its contents even after you turn off your system. Examples of code in ROM include the program that initiates your system's boot routine and the POST.

RPM

Abbreviation for Red Hat Package Manager.

schema

A collection of class definitions that describes managed objects in a particular environment. A CIM schema is a collection of class definitions used to represent managed objects that are common to every management environment, which is why CIM is called the Common Information Model.

SCSI

Acronym for small computer system interface. An I/O bus interface with faster data transmission rates than standard ports. You can connect up to seven devices (15 for some newer SCSI types) to one SCSI interface.

server module

A modular system component that functions as an individual system. To function as a system, a server module is inserted into a chassis which includes power supplies, fans, a system management module, and at least one network switch module. The power supplies, fans, system management module, and network switch module are shared resources of the server modules in the chassis. See modular system.

service tag number

A bar code label that identifies each system in the event that you need to call for customer or technical support.

SMART

Acronym for Self-Monitoring Analysis and Reporting Technology. A technology that allows hard drives to report errors and failures to the system BIOS, which then displays an error message on the screen. To take advantage of this technology, you must have a SMART-compliant hard drive and the proper support in the system BIOS.

SMBIOS

Acronym for system management BIOS.

SNMP

Abbreviation for Simple Network Management Protocol. SNMP, a popular network control and monitoring protocol, is part of the original TCP/IP protocol suite. SNMP provides the format in which vital information about different network devices, such as network servers or routers, can be sent to a management application.

SNMP trap

A notification (event) generated by the RAC or ESM that contains information about state changes on the

managed system or about potential hardware problems.

SOL

Abbreviation for Serial Over LAN. SOL enables suitably designed servers to transparently redirect the serial character stream of a baseboard UART to/from a remote client over a shared LAN. The architecture requires software running on the managed system's BMC and client software running on a management station and/or a central network proxy.

support commands

Commands that specify how an action should be performed.

syntax

The rules that dictate how you must type a command or instruction so that the system understands it. A variable's syntax indicates its data type.

system configuration information

Data stored in memory that tells a system what hardware is installed and how the system should be configured for operation.

system diskette

System diskette is a synonym for bootable diskette.

system memory

System memory is a synonym for RAM.

System Setup utility

A BIOS-based utility that allows you to configure your system's hardware and customize the system's operation by setting such features as password protection and energy management. Some options in the System Setup utility require that you reboot the system (or the system may reboot automatically) in order to make a hardware configuration change.

system.ini file

A start-up file for the Windows operating system. When you start Windows, it consults the **system.ini**

file to determine a variety of options for the Windows operating environment. Among other things, the **system.ini** file records which video, mouse, and keyboard drivers are installed for Windows.

Running the Control Panel or Windows Setup program may change options in the **system.ini** file. On other occasions, you may need to change or add options to the **system.ini** file manually with a text editor, such as Notepad.

TCP/IP

Abbreviation for Transmission Control Protocol/Internet Protocol. A system for transferring information over a computer network containing dissimilar systems, such as systems running Windows and UNIX.

text editor

An application program for editing text files consisting exclusively of ASCII characters. Windows Notepad is a text editor, for example. Most word processors use proprietary file formats containing binary characters, although some can read and write text files.

text mode

A video mode that can be defined as x columns by y rows of characters.

UART

Acronym for universal asynchronous receiver-transmitter. The UART is a system component that handles asynchronous serial communication by converting parallel bytes from the processor into serial bits for transmission (and vice versa).

unicode

A fixed width, 16-bit world wide character encoding, developed and maintained by the Unicode Consortium.

upper memory area

The 384 KB of RAM located between 640 KB and 1 MB. If the system has an Intel386 or higher microprocessor, a utility called a memory manager can create UMBs in

the upper memory area, in which you can load device drivers and memory-resident programs.

URL

Abbreviation for Uniform Resource Locator (formerly Universal Resource Locator).

USB

Abbreviation for Universal Serial Bus. A USB connector provides a single connection point for multiple USB-compliant devices, such as mice, keyboards, printers, and computer speakers. USB devices can also be connected and disconnected while the system is running.

utility

A program used to manage system resources—memory, disk drives, or printers, for example.

utility partition

A bootable partition on the hard drive that provides utilities and diagnostics for your hardware and software. When activated, the partition boots and provides an executable environment for the partition's utilities.

UUID

Abbreviation for Universal Unique Identification.

variable

A component of a managed object. A temperature probe, for example, has a variable to describe its capabilities, its health or status, and certain indexes that you can use to help you in locating the right temperature probe.

VESA

Acronym for Video Electronics Standards Association.

virtual memory

A method for increasing addressable RAM by using the hard drive. For example, in a system with 16 MB of RAM and 16 MB of virtual memory set up on the hard

drive, the operating system would manage the system as though it had 32 MB of physical RAM.

VT-100

Abbreviation for Video Terminal 100, which is used by the most common terminal emulation programs.

WAN

Abbreviation for wide area network.

Web server

A secure port server that makes Web pages available for viewing by Web browsers using the HTTP protocol.

WH

Abbreviation for watt-hour(s).

win.ini file

A start-up file for the Windows operating system. When you start Windows, it consults the **win.ini** file to determine a variety of options for the Windows operating environment. Among other things, the **win.ini** file records what printer(s) and fonts are installed for Windows. The **win.ini** file also usually includes sections that contain optional settings for Windows application programs that are installed on the hard drive. Running the Control Panel or Windows Setup program may change options in the **win.ini** file. On other occasions, you may need to change or add options to the **win.ini** file manually with a text editor such as Notepad.

write-protected

Read-only files are said to be write-protected. You can write-protect a 3.5-inch diskette by sliding its write-protect tab to the open position or by setting the write-protect feature in the System Setup program.

XMM

Abbreviation for extended memory manager, a utility that allows application programs and operating systems to use extended memory in accordance with the XMS.

XMS

Abbreviation for eXtended Memory Specification.

X Windows system

The graphical user interface used in the Red Hat Enterprise Linux environment.

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