# Dell OpenManage Baseboard Management Controller Utilities 4.5

# User's Guide

# Notes and Cautions

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

**CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.**

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# Contents

# 1

# Introduction

The Dell 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 power 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 Linux Enterprise server 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 you 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 Remote Access Configuration Utility in *x9xx* systems enables configuring BMC in a pre-operating system environment.

- The Dell OpenManage Deployment Toolkit SYSCFG 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.

- Command Line Interface (CLI) tools provide a command line tool for sensor status information, System Event Log (SEL) access, and power control.

Additionally, 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.

# What's New

BMC does not have any updates for this release.

# Supported Systems and Operating Systems

BMC Management Utility supports new Dell systems running supported Microsoft Windows and Linux systems by implementing the new IPMItool commands to monitor your system's power, view, and set the LCD status.

For the complete list of supported systems and operating systems, see the **readme.txt** file in the root installation folder, or the *Dell Systems Software Support Matrix* available on the Dell Support website at **support.dell.com/manuals**.

> **NOTE:** All references in this document to *x9xx* systems also apply to the PowerVault NX1950, PowerVault 500, and PowerVault 600 systems. All references to the PowerEdge 840 system also apply to the PowerVault 100 system.

> **NOTE:** The new power monitoring features are not supported on IPMIsh and SOLProxy.

# BMC Configuration and Management Tasks

The following sections document 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:

- Configuring the BMC
- Managing the BMC

### Configuring the BMC

To configure the BMC on a managed system in a pre-boot environment, you can use:

- Dell Deployment Toolkit (DTK)
- Remote Access Configuration Utility in *x9xx* systems

**NOTE:** The Remote Access Configuration Utility is called the *BMC Setup Module* in Dell PowerEdge *x8xx* systems, *iDRAC Configuration Utility* in *xx0x* systems, and *iDRAC6 Configuration Utility* in *xx1x* systems.

- Dell Remote Access Controller (DRAC) 5 graphical user interface (GUI)
- iDRAC6 Enterprise graphical user interface (GUI)
- Command Line Interface (CLI)

from a management station 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" on page 31 for more information.

## Managing the System Using BMC

To manage the BMC in a pre-boot environment, or to access the BMC of a system, you can use the BMC Management Utility. See "Using the BMC Management Utility" on page 51. 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 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**
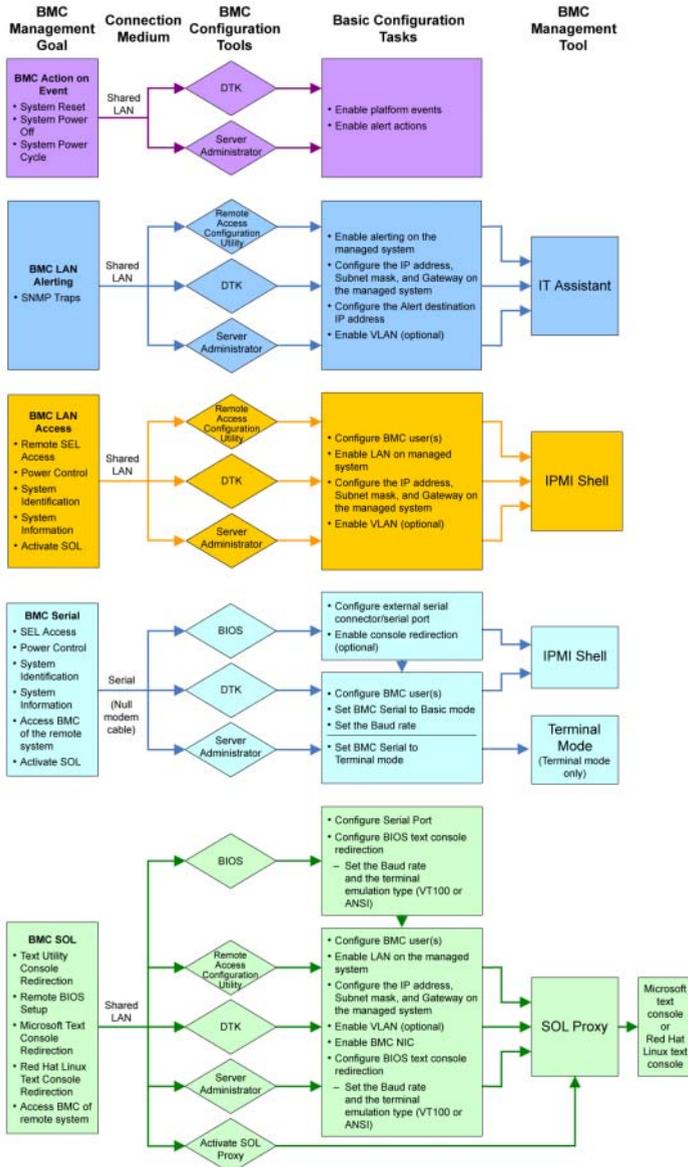
## BMC Action on Event

If you plan to use your system's BMC to perform actions when events occur, you must follow the BMC Action on Event configuration guidelines listed in Table 1-1.

**Table 1-1.   BMC Action on Event Configuration Guidelines**

| Features | Connection Medium | BMC Configuration Tools | Basic Configuration Tasks | Management Tools |
|---|---|---|---|---|
| • System Reset<br>• System Power Off<br>• System Power Cycle | LAN | • Deployment Toolkit (pre-operating system environment)<br>• Server Administrator | • Enable platform events<br>• Enable alert actions | NA |

## Basic BMC Alerting Over a LAN

If you plan to use your system's BMC to send alerts (Platform Event Traps), you must follow the BMC configuration guidelines listed in Table 1-2.

NOTE: The LAN-sharing depends on the NIC selection configuration option. The available options are **Shared** and **Failover.** If you are using iDRAC6 Enterprise, the additional option available is **Dedicated**. See the NIC Selection option in the table in "Remote Access Configuration Utility Options" on page 32 for more information on **Shared**, **Failover**, and **Dedicated.**

**Table 1-2.  BMC LAN Alerting Configuration Guidelines**

| Features | Connection Medium | BMC Configuration Tools | Basic Configuration Tasks | Management Tools |
|---|---|---|---|---|
| Platform Event Alerts (SNMP Traps) | LAN | • Remote Access Configuration Utility in *x9xx* systems (pre-operating system environment)<br><br>• Deployment Toolkit (pre-operating system environment)<br><br>• Server Administrator | **1** Configure NIC Selection to select Shared, Failover, or Dedicated<br><br>**NOTE:** This option is available only on Dell PowerEdge *x9xx, xx0x,* and *xx1x* systems.<br><br>**2** Configure the IP address, Subnet mask, and Gateway on the managed system<br><br>**3** Configure the VLAN (optional)<br><br>**4** Enable alerting<br><br>**5** Configure the Alert destination IP address<br><br>**6** Configure the Host Name (optional) | IT Assistant |

## IPMI Shell Over a LAN

Table 1-3 lists the actions you can perform, if you plan to use the BMC Management Utility's IPMI Shell or IPMItool to access your system's BMC over a LAN.

**Table 1-3.   BMC LAN Access Configuration Guidelines**

| Features | Connection Medium | BMC Configuration Tools | Basic Configuration Tasks | Management Tools |
|---|---|---|---|---|
| • Remote SEL access<br>• Power control<br>• System identification<br>• Sensor information | LAN | • Remote Access Configuration Utility in *x9xx* systems (pre-operating system environment)<br>• Deployment Toolkit (pre-operating system environment)<br>• Server Administrator | 1 Enable IPMI over LAN on the managed system<br>2 Configure NIC selection to select Shared, Failover, or Dedicated<br>**NOTE:** This option is available only on Dell PowerEdge *x9xx, xx0x,* and *xx1x* systems.<br>3 Configure the IP address, Subnet mask, and Gateway on the managed system<br>4 Configure IPMI encryption key (optional)<br>**NOTE:** This option is available only on Dell PowerEdge *x9xx, xx0x,* and *xx1x* systems.<br>5 Configure VLAN (optional)<br>6 Configure BMC users | IPMI Shell |

## IPMI Shell Over the Serial Cable

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

**NOTE:** Console redirection does not apply to BMC when using the serial interface.

**Table 1-4.  BMC Serial Configuration Guidelines**

| Features | Connection Medium | BMC Configuration Tools | Basic Configuration Tasks | Management Tools |
|---|---|---|---|---|
| • Interactive mode<br>• Remote SEL access<br>• Power control<br>• System identification<br>• System information<br>• Access the BMC of the remote system | Accessed through the serial channel by using a null modem cable | • BIOS (pre-operating system environment)<br>• Deployment Toolkit (pre-operating system environment)<br>• Server Administrator (to enable BMC serial only) | **1** Configure Serial Port 1 to BMC Serial<br>**NOTE:** This option is available only on Dell PowerEdge *x8xx* systems.<br>**2** Configure External Serial Connector to Remote Access<br>**NOTE:** This option is available only on Dell PowerEdge *x9xx, xx0x,* and *xx1x* systems. | • IPMI Shell (Basic mode)<br>• Terminal emulation (Terminal mode only) |

**Table 1-4.   BMC Serial Configuration Guidelines** *(continued)*

| Features | Connection Medium | BMC Configuration Tools | Basic Configuration Tasks | Management Tools |
|---|---|---|---|---|
| • System information<br>• Access the BMC of the remote system | | | **3** Set Serial baud rate to match the rate to be used by the management tool<br>**4** Set BMC Serial Connection Mode to Basic for IPMI Shell or Terminal for Terminal emulation<br>**5** Configure BMC users | |

## SOL Proxy Over a LAN

If you plan to use the BMC Management Utility's SOL Proxy to access your system's console over a 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 | Management Tools |
|---|---|---|---|---|
| • Text Utility console redirection<br><br>• Remote BIOS setup<br><br>• Microsoft text console redirection<br><br>• Linux text console redirection | LAN | • BIOS (pre-operating system environment)<br><br>• Remote Access Configuration Utility in *x9xx* systems (pre-operating system environment)<br><br>• Deployment Toolkit (pre-operating system environment)<br><br>• Server Administrator | **1** Configure Serial Port 1 to BMC NIC<br><br>**NOTE:** This option is available only on Dell PowerEdge *x8xx* systems.<br><br>**2** Configure BIOS console redirection to Serial Port 1.<br><br>**NOTE:** This option is available only on Dell PowerEdge *x9xx* systems.<br><br>**3** Configure Console Redirection to On with Console Redirection via COM2<br><br>**NOTE:** This option is available only on Dell PowerEdge *x9xx, xx0x,* and *xx1x* systems. | • SOL Proxy<br><br>• IPMI Shell |

**Table 1-5.  BMC SOL Configuration Guidelines** *(continued)*

| Features | Connection Medium | BMC Configuration Tools | Basic Configuration Tasks | Management Tools |
|---|---|---|---|---|
| • Force a reboot on a remote system and activate console redirection<br><br>• Access BMC of the remote system | | | **4** Configure other Console Redirection parameters, such as baud rate, emulation type, and so on.<br><br>**5** Enable IPMI over LAN on the managed system<br><br>**6** Configure the IP address, Subnet mask, and Gateway on the managed system<br><br>**7** Configure IPMI encryption key (optional)<br><br>**NOTE:** This option is available only on Dell PowerEdge *x9xx, xx0x,* and *xx1x* systems.<br><br>**8** Configure VLAN (optional)<br><br>**9** Configure BMC users | |

# BMC Configuration and Management Tools

### Using the Remote Access Configuration Utility in *x9xx* systems

The Remote Access Configuration Utility in *x9xx* systems provides basic BMC setup and configuration functions that can be accessed during system boot. Use the utility for initial BMC setup and configuration only. For advanced configuration tasks, you must use the Deployment Toolkit SYSCFG utility or Server Administrator Version 2.0 or later.

> **NOTE:** The Remote Access Configuration Utility is called the *BMC Setup Module* in Dell PowerEdge *x8xx* systems, *iDRAC Configuration Utility* in *xx0x* systems, and *iDRAC6 Configuration Utility* in *xx1x* systems.

### Using Deployment Toolkit

The Deployment Toolkit (DTK) SYSCFG utility provides a powerful Microsoft Windows Preinstallation Environment (PE) and Linux command-line interface for locally configuring your system's BMC as part of an initial deployment. Use the DTK SYSCFG utility to set all supported BMC features. Additionally, you can use the Deployment Toolkit utilities to capture and replicate system settings on similar systems. See "Configuring Your BMC Using the Deployment Toolkit Utility" on page 40 for more information on how to install and set up the DTK SYSCFG utility.

### Using the BMC Management Utility

The BMC Management Utility provides a command-line interface to your 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 SOL Proxy to access and manage the BMC. To use the BMC Management Utility, you must perform the following tasks:

- Configure BMC using the Remote Access Configuration Utility in *x9xx* systems, the DTK SYSCFG utility, or Server Administrator.
- Install the BMC Management Utility on a management station.

See "Configuring Your Managed System" on page 25 for instructions on configuring the BMC on a managed system in preparation for using the BMC Management Utility.

### Using Server Administrator

The Server Administrator provides a convenient and easy-to-use GUI for remotely configuring or managing your system's BMC on a system running a supported operating system. You can use the Server Administrator to configure the most relevant BMC features, such as Platform Event Filter (PEF) parameters and alert destinations. Additionally, Server Administrator can be used as a 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.
- Access the Server Administrator home page remotely or locally from a supported browser on a management station.
- Configure BMC remotely or locally on the managed system.

See the *Dell OpenManage Server Administrator User's Guide* and *Command line Interface User's Guide* on the Dell Support website at **support.dell.com/manuals** for more information about using Server Administrator to configure and manage your system BMC.

## Other Documents You May Need

In addition to this guide, you can access the following guides available on the Dell Support website at **support.dell.com/manuals**. On the **Manuals** page, click **Software→ Systems Management**. Click on the appropriate product link on the right-side to access the documents.

- The *Dell OpenManage Software Quick Installation Guide* provides an overview of applications that you can install on your management station (console) and on your managed systems and procedures for installing your console and managed system applications on systems running supported operating systems.
- The *Dell OpenManage Server Administrator User's Guide* provides additional information about using Server Administrator to manage your system's BMC.

- The *Dell OpenManage Deployment Toolkit User's Guide* provides additional information about installing and using the DTK utilities.

- The *Dell OpenManage Deployment Toolkit 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* 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).

- The *Dell Remote Access Controller 5 User's Guide* provides complete information about installing and configuring a DRAC 5 and using DRAC 5 to remotely access an inoperable system.

- The *Dell Systems Software Support Matrix* provides information about the various Dell systems, the operating systems supported by these systems, and the Dell OpenManage components that can be installed on these systems.

- The Dell system *User's Guide* provides supplemental information about configuring your BIOS settings with the System Setup Program, as well as instructions for configuring your system to use console redirection.

- The *Integrated Dell Remote Access Controller 6 (iDRAC6) Enterprise for Blade Servers User Guide* provides information about configuring and using an iDRAC6 for blade servers to remotely manage and monitor your system and its shared resources through a network.

- The *Integrated Dell Remote Access Controller 6 (iDRAC6) User Guide* provides complete information about configuring and using an iDRAC6 for tower and rack servers to remotely manage and monitor your system and its shared resources through a network.

- The *Command Line Reference Guide for iDRAC6 and CMC* provides information about the RACADM subcommands, supported interfaces, property database groups and object definitions for iDRAC6 and CMC.

- The *Glossary* provides information about the terms used in this document.

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 Systems Management Tools and Documentation DVD* and on the Dell Support website at **support.dell.com/manuals**.

# 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* or the Hardware Owner's Manual.

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.

# 2

# Configuring Your Managed System

Before using the BMC Management Utility, configure certain items, such as the necessary system BIOS, network, Intelligent Platform Management Interface (IPMI) encryption key, and serial connection settings, depending on the functionality to be performed, to enable access to the BMC.

> **NOTE:** The IPMI encryption key is a public key that is used to generate an encryption key for use between the firmware and the application.

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 Dell OpenManage Deployment ToolKit (DTK) SYSCFG utility
- Configuring your BMC with Dell OpenManage 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. To configure the necessary system BIOS setting, your must enter the System Setup Program. The BIOS settings can also be configured using the Deployment Toolkit or the Server Administrator.

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

## Configuring System BIOS in Dell PowerEdge *x8xx/x9xx* Systems

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 the operating system begins to load before you press <F2>, allow your system to boot, 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).

   To use BMC, serial port 1 uses the **COM1** address and communication can be through 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. Optionally, you can also enable **Redirection after Boot.**

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`

**13** Choose the appropriate option and exit the system setup.

### Configuring System BIOS in Dell PowerEdge *x9xx* and *xx0x* Systems

**1** Turn on and restart your system.

**2** Press <F2> immediately after you see the following message:

`<F2> = Setup`

The **System Setup** screen appears.

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

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

**4** Use the spacebar to select the appropriate serial communication option.

**5** Press <Enter> to select the appropriate option for Console Redirection. The following options are available:

**On without Console Redirection:** COM1 and COM2 are enabled and available for use by the operating system or applications. Console redirection is disabled. This is the default option.

**On with Console Redirection via COM1:** When BIOS console redirection is enabled through COM1, the COM1 port is not available to applications through the operating system.

**On with Console Redirection via COM2:** When BIOS console redirection is enabled through COM2, the COM2 port is not available to applications through the operating system.

**Off:** COM1 and COM2 are both disabled and not available for use by the operating system or applications. BIOS Console redirection is disabled.

> **NOTE:** Select **On with Console Redirection via COM2** to use Console Redirection with SOL.

6   Use the up- and down- arrow keys to navigate to the **External Serial Communication** field and press <Enter>.

7   Use the spacebar to select the appropriate external serial communication option.

     The available options are **COM1, COM2,** and **Remote Access.** The default option is **COM1.**

> **NOTE:** Select **Remote Access** to access the BMC through the serial cable connection. This option can be set to any value for using SOL and accessing the BMC over LAN.

8   Press <Enter> to select.

9   If required, use the spacebar to navigate to and change the settings for **Redirection after Boot.**

10   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.

11   Use the up- and down- arrow keys navigate to the **Remote Terminal Type** option and then use the space bar to select either **VT 100/VT 200** or **ANSI,** if applicable.

12   Press <Enter> to return to the **System Setup** screen.

13   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.

## Configuring System BIOS in Dell PowerEdge *xx*1*x* Systems

**1** Turn on and restart your system.

**2** Press <F2> immediately after you see the following message:

`<F2> = Setup`

The **System Setup** screen displays.

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

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

**4** Use the spacebar to select the appropriate serial communication option.

**5** Press <Enter> to select the appropriate option for Console Redirection. The following options are available:

**On without Console Redirection:** COM1 and COM2 are enabled and available for use by the operating system or applications. Console redirection is disabled. This is the default option.

**On with Console Redirection via COM1:** When BIOS console redirection is enabled through COM1, the COM1 port is not available to applications through the operating system.

**On with Console Redirection via COM2:** When BIOS console redirection is enabled through COM2, the COM2 port is not available to applications through the operating system.

**Off:** COM1 and COM2 are both disabled and not available for use by the operating system or applications. BIOS Console redirection is disabled.

> **NOTE:** Select **On with Console Redirection via COM2** to use Console Redirection with SOL.

**6** Use the up- and down- arrow keys to navigate to the **Serial Port Address Selection** field to select **COM1** or **COM2**.

**7** Use the up- and down- arrow keys to navigate to the appropriate **External Serial Connector** option.

The available options are **SerialDevice1**, **SerialDevice2**, and **Remote Access Device.**

> **NOTE:** Use only **SerialDevice2** for SOL.

**8** 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.

**9** 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 220** or **ANSI,** if applicable.

**10** Use the up- and down- arrow keys to navigate to and change the settings for **Redirection After Boot.**

**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 your system.

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

## Using BIOS Console Redirection With SOL Proxy

Console redirection allows maintenance of a system from a remote location by redirecting keyboard input and output through the serial port. Any console-based feature or operating system can then be used to access the server. DR-DOS, Linux (init 3) and Windows Special Administrative Console (SAC) are examples of operating systems and consoles that can be used to access the server.

By default, some operating systems, such as Windows Server 2003, are automatically configured to send text console output to the BIOS. Manual configuration of the **Redirection after Boot** feature through the system BIOS may not be visible to the operating system. This results in both, the operating system feature and the BIOS redirection feature, being enabled. Depending on the operating system and its setup, the results may vary. Dell recommends the following steps as good practice:

**DR-DOS:** Do not configure DR-DOS for serial console output. Enable console redirection after reboot in system BIOS.

**Windows Special Administrative Console (SAC):** Do not configure Windows SAC for serial console redirection. Enable console redirection after reboot in system BIOS.

**Linux:** Do not configure console redirection after rebooting the system BIOS. Do the tasks listed in the "Installation and Setup for Linux Operating Systems" on page 44, to configure Linux for console redirection.

**NOTE:** See "Escape Key Sequences" on page 129 for a list of keystrokes to be used for BIOS Setup operations from a serial terminal.

# Baseboard Management Controller Configuration

You can perform basic BMC configuration using the Remote Access Configuration Utility in *x9xx* systems during system startup. See Figure 2-1. For more advanced configuration options, see the instructions for the DTK SYSCFG utility in the *Deployment Toolkit User's Guide*.

**NOTE:** The Remote Access Configuration Utility in Dell PowerEdge *x9xx* systems is called the *BMC Setup Module* in *x8xx* systems, *iDRAC Configuration Utility* in *xx0x* systems and *iDRAC6 Configuration Utility* in *xx1x* systems. For more information on the *iDRAC Configuration Utility*, see the *Integrated Dell Remote Access Controller User's Guide* available on the Dell Support website at **support.dell.com/manuals**.

**Figure 2-1.    Remote Access Configuration Utility in x9xx systems**
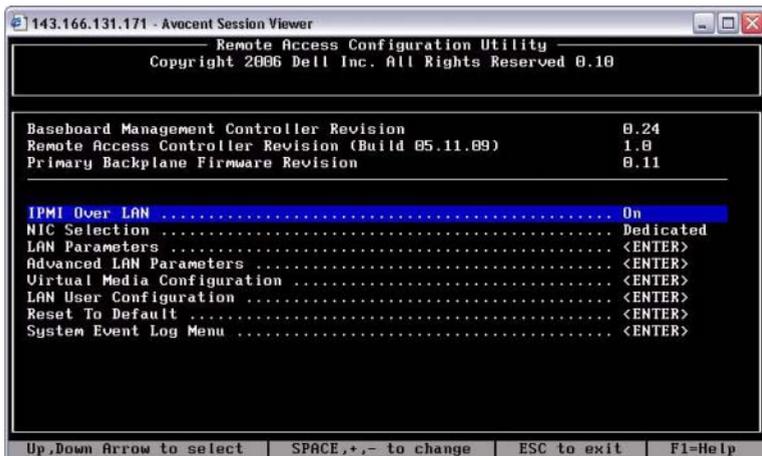
## Entering the Remote Access Configuration Utility in *x9xx* systems

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 <Crtl-E>, allow
   the system to finish booting, and then restart your system and try again.

## Remote Access Configuration Utility Options

Table 2-1 lists the Remote Access Configuration Utility options and shows
how to configure the BMC on a managed system. After entering all settings,
press <Esc> and select one of the following:

- **Save Changes and Exit—** Keep all entries made in the Remote Access
  Configuration Utility.

- **Discard Changes and Exit—** Undo all entries made in the Remote Access
  Configuration Utility.

- **Return to Setup—** Continue using the Remote Access Configuration
  Utility.

**Table 2-1.  Remote Access Configuration Utility in *x9xx* systems**

| Option | Description |
| --- | --- |
| iDRAC6 LAN<br><br>**NOTE:** This option is available in the iDRAC6 Configuration Utility on Dell PowerEdge *xx1x* systems. | Enables or disables the iDRAC6 LAN. The LAN must be enabled to permit use of iDRAC6 facilities, such as the Web interface, telnet/SSH access to the SM-CLP command line interface, console redirection, and virtual media. |
| IPMI Over LAN | Enables or disables the out-of-band LAN channel access to the shared network controller.<br><br>**NOTE:** When you select **Off**, the iDRAC will not accept IPMI messages arriving over the LAN interface on Dell PowerEdge *xx1x* systems. |

**Table 2-1.   Remote Access Configuration Utility in *x9xx* systems *(continued)***

| Option | Description |
|---|---|
| NIC Selection<br><br>**NOTE:** This option is available only on Dell PowerEdge *x9xx, xx0x,* and *xx1x* systems. | Displays the configuration option.<br><br>• Shared<br><br>Select this option to share the network interface with the host operating system. The remote access device network interface is fully functional when the host operating system is configured for NIC teaming.<br><br>The remote access device receives data through NIC 1 and NIC 2, but transmits data only through NIC 1.<br><br>If NIC 1 fails, the remote access device will not be accessible.<br><br>**NOTE:** The NIC 2 is not available on PowerEdge 1900 system.<br><br>• Failover<br><br>Select this option to share the network interface with the host operating system. The remote access device network interface is fully functional when the host operating system is configured for NIC teaming.<br><br>The remote access device receives data through NIC 1 and NIC 2, but transmits data only through NIC 1. If NIC 1 fails, the remote access device fails over to NIC 2 for all data transmission.<br><br>The remote access device continues to use NIC 2 for data transmission. If NIC 2 fails, the remote access device fails over all data transmission back to NIC 1.<br><br>**NOTE:** This option cannot be selected on the PowerEdge 1900 system. |

**Table 2-1. Remote Access Configuration Utility in *x9xx* systems *(continued)***

| Option | Description |
|---|---|
| | • Dedicated |
| | Select this option to enable the remote access device to utilize the dedicated network interface available on iDRAC6 Enterprise. This interface is not shared with the host operating system and routes the systems management traffic to a separate physical network, enabling it to be separated from the application traffic. |
| | **NOTE:** This option is available only on systems with iDRAC6 Enterprise. |
| **LAN Parameters** | |
| RMCP+ Encryption Key | **NOTE:** This option is available only on PowerEdge *x9xx, xx0x,*and *xx1x* systems. |
| | The Key is used to encrypt the IPMI sessions. The encryption key is entered as a maximum of 20 pairs of ASCII hexadecimal characters representing 20 bytes. For example, 01FA3BA6C812855DA001FA3BA6C812855DA0A0A0. |
| IP Address Source | Displays whether the network controller will be assigned a **Static** IP address or a **DHCP** address. |
| Ethernet IP Address | The static IP address of the BMC. This field is limited to a maximum value of 255.255.255.255. |
| | The following IPv4 rules apply: |
| | • IP addresses cannot be 127.xxx.xxx.xxx, where xxx is between 0-255. |
| | • The first octet must be between 1-223 (that is, 143.xxx.xxx.xxx) |
| | **NOTE:** IP address 169.254.0.2 subnet mask 255.255.0.0 is returned when the BMC is unable to contact the DHCP server. |
| MAC Address | This field is read-only. |
| | Displays the network controller's BMC MAC address. |
| Subnet Mask | The subnet mask for the static IP address. |
| | **NOTE:** IP address 169.254.0.2 subnet mask 255.255.0.0 is returned when the BMC is unable to contact the DHCP server. |

**Table 2-1. Remote Access Configuration Utility in *x9xx* systems *(continued)***

| Option | Description |
|---|---|
| Default Gateway | The IP gateway for the static IP address. |
| VLAN Enable | Enables or disables the virtual LAN ID. |
| VLAN ID | This field is read-only when `VLAN Enable` is set to `off`. |
| | To enter a value, navigate to the VLAN ID field from another field. |
| | A valid value for the virtual LAN ID must be a number from 1 to 4094. |
| | **NOTE:** If you enter a value outside the specified range, either 1 or 4094 is entered, whichever is closest. |
| VLAN | This field is read-only when `VLAN Enable` is set to `off`. |
| | Specifies the priority of the VLAN. The valid values range from `Priority 0 - Priority 7`. |
| Register iDRAC6 Name<br>**NOTE:** This option is available in the iDRAC6 Configuration Utility on Dell PowerEdge *xx1x* systems. | Select **On** to register the iDRAC6 name in the DNS service. Select **Off** if you do not want users to find the iDRAC6 name in DNS. |
| iDRAC6 Name<br>**NOTE:** This option is available in the iDRAC6 Configuration Utility on Dell PowerEdge *xx1x* systems. | If **Register iDRAC6 Name** is set to **On**, press `<Enter>` to edit the **Current DNS iDRAC6 Name** text field. Press `<Enter>` when you have finished editing the iDRAC6 name. Press `<Esc>` to return to the previous menu. The iDRAC6 name must be a valid DNS host name. |
| LAN Alert Enabled | Enables or disables LAN alerting. |
| Alert Policy Entry 1 | Enables or disables the first alert destination. |

**Table 2-1.  Remote Access Configuration Utility in *x9xx* systems *(continued)***

| Option | Description |
|---|---|
| Alert Destination 1 | This field is read-only when `LAN Alert Enabled` is set to `off`. |
| | Enter the IP address of the first alert destination. Use the Left or Right arrow keys to navigate to each octet. Use the numeric keypad to enter each octet. |
| | The following IPv4 rules apply: |
| | • IP addresses cannot be `127.xxx.xxx.xxx`, where `xxx` is between `0-255`. |
| | • The first octet must be between `1-223` (i.e. `143.xxx.xxx.xxx`) |
| | • The last octet must not be `0` or `255` (i.e. `xxx.xxx.xxx.0` or `xxx.xxx.xxx.255`) |
| Host Name String | Specifies the managed system hostname used to correlate Platform Event Traps to the system on which they originate. |
| | Use alpha-numerics, but no symbols (except '-') or spaces. |
| **Smart Card Logon** | Select **Enabled** to enable Smart Card logon. Enabling Smart Card logon disables all CLI out-of-band interfaces. Select **Disabled** to disable Smart Card logon. All command line out-of-band interfaces are set to their default state. Select **Enabled with RACADM** to enable Smart Card logon along with remote RACADM. All other CLI out-of-band interfaces are disabled. |
| | **NOTE:** This option is available only on *xx0x* and *xx1x* systems. |
| **IPv6 Settings** | Specifies the LAN Configuration for IPv6. |
| | **NOTE:** This option is available in the iDRAC6 Configuration Utility on *xx1x* systems. See the *Integrated Dell Remote Access Controller User's Guide* available on the Dell Support website at **support.dell.com/manuals** for more information. |
| **Advanced LAN Parameters** | **NOTE:** This option is available only on systems with a DRAC installed. |
| **Dedicated NIC Configuration Options** | |
| NIC | Enables or disables the NIC |
| Auto-Negotiate | Enables or disables Auto-Negotiation of the LAN Speed. |

**Table 2-1.  Remote Access Configuration Utility in *x9xx* systems *(continued)***

| Option | Description |
|---|---|
| LAN Speed Setting | This field is read-only when `Auto-Negotiate` is set to `Enabled`. |
| | Sets the LAN Speed Setting to 10 or 100 Mbps |
| LAN Duplex Setting | This field is read-only when `Auto-Negotiate` is set to `Enabled`. |
| | Sets the LAN communication method to Half or Full Duplex. |
| **DNS Configuration Options** | |
| DNS Servers from DHCP | `on` = IP addresses of the DNS Servers are assigned by the DHCP |
| | `off` = IP addresses of the DNS Servers are set manually |
| DNS Server 1 | This field is read-only when `DNS Servers from DHCP` is set to `on`. |
| | Enter the IP Address of DNS Server 1 |
| | The following IPv4 rules apply: |
| | • IP addresses cannot be `127.xxx.xxx.xxx`, where `xxx` is between `0-255`. |
| | • The first octet must be between `1-223` (i.e. `143.xxx.xxx.xxx`) |
| | • The last octet must not be `0` or `255` (i.e. `xxx.xxx.xxx.0` or `xxx.xxx.xxx.255`) |
| DNS Server 2 | This field is read-only when `DNS Servers from DHCP` is set to `on`. |
| | Enter the IP Address of DNS Server 2 |
| | The following IPv4 rules apply: |
| | • IP addresses cannot be `127.xxx.xxx.xxx`, where `xxx` is between `0-255`. |
| | • The first octet must be between `1-223` (i.e. `143.xxx.xxx.xxx`) |
| | • The last octet must not be `0` or `255` (i.e. `xxx.xxx.xxx.0` or `xxx.xxx.xxx.255`) |
| Register RAC Name | `on` = You may enter the Current DNS RAC Name. |

**Table 2-1. Remote Access Configuration Utility in *x9xx* systems *(continued)***

| Option | Description |
|---|---|
| Register RAC Name | This field is read-only when `Register RAC Name` is set to `off`. |
| | Enter the Current DNS RAC Name using 1-32 alpha-numerics, spaces, and symbols. Press <Enter> to save the value. Press <Esc> to exit the field without saving. |
| Domain Name from DHCP | Turns the domain name on or off. |
| Domain Name | This field is read-only when `DNS Servers from DHCP` is set to `on`. |
| | Enter the Domain Name using 1-64 alpha-numerics, spaces, and symbols. Press <Enter> to save the value. Press <Esc> to exit the field without saving. |
| Virtual Media Configuration | **NOTE:** This option is available only on systems with a DRAC installed. |
| Virtual Media | Attaches or detaches a virtual media drive. |
| Virtual Flash | Enables or disables virtual flash memory. |
| **LCD Configuration** | Configures the virtual Keyboard Video Mouse (vKVM) session status on LCD and the access level to the LCD. |
| LCD User Defined String | Sets the line of user-defined text on the system LCD. |
| LCD System Power Units | Sets the unit for the system power. |
| LCD Ambient Temp Units | Sets the unit for the ambient temperature. |
| LCD Error Display | Sets the error display field. |
| LCD Front Panel Access | Allows you to either *View*, or *View and Modify*, or *Lock* the data on the LCD. |
| LCD Remote KVM Indication | Enables or disables the vKVM session status on the LCD. |
| **LAN User Configuration** | Enables setting the user name, user password, user privilege, and enables user access for user ID=2. |

**Table 2-1.  Remote Access Configuration Utility in *x9xx* systems *(continued)***

| Option | Description |
|---|---|
| Account Access | Enables or disables account privileges. |
| Account Privilege | Sets the account to: <br> Admin, User, Operator, or No Access |
| Account User Name | Sets the account user name. |
| Enter Password | Enter the password for this Account User. You must enter at least one non-null character. |
| Confirm Password | Confirm the password you entered. |
| Reset To Default | Clears the BMC settings and resets the BMC setting to the defaults. <br><br> **⚠ CAUTION: Resetting to factory defaults will restore remote non-volatile settings.** |
| System Event Log Menu | Enables viewing and clearing the System Event Log (SEL). A popup box will indicate that the SEL is being read. |
| Total System Event Log Entries | Displays the number of records in the SEL. |
| View System Event Log | Displays a record in the SEL, starting with the most recent record. Enter a record number to view, using the `Advance to Entry` field. Use the Right and Left arrow keys to scroll up and down the SEL. |
| Clear System Event Log | Erases all records in the SEL. |

✎ **NOTE:** If the first integrated network interface controller (NIC 1) is used in an Ether Channel team or link aggregation team, the BMC management traffic will not function on PowerEdge *x8xx* systems. The NIC teaming option is supported on PowerEdge *x9xx*, *xx0x*, and *xx1x* systems. For more information about network teaming, see the documentation for the network interface controller.

# Configuring Your BMC Using the Deployment Toolkit Utility

The Dell OpenManage Deployment Toolkit SYSCFG utility includes a set of Microsoft Windows PE and Linux-based utilities for configuring and deploying Dell systems. The Deployment ToolKit (DTK) SYSCFG utility is specifically designed to address all necessary BMC configuration tasks using a powerful and comprehensive command-line interface. This utility runs on PowerEdge 1435SC and all supported PowerEdge *x7xx*, *x8xx*, *x9xx*, *xx0x*, and *xx1x* systems.

To use the BMC Management Utility, configure your managed system with the SYSCFG utility by performing the following tasks:

- Obtain the latest version of DTK from the Dell Support website at **support.dell.com**.

- Create a BMC configuration CD containing a bootable image, and the SYSCFG utility.

- Configure BMC Users.

- Configure BMC SOL access.

- Configure BMC IPMI serial access.

## Installation and Setup for Microsoft Windows PE Operating Systems

> **NOTE:** See the *Deployment Toolkit User's Guide* for additional information about installing and using the utilities, and the *Deployment Toolkit Command Line Interface Reference Guide* for a complete list of valid options, suboptions, and arguments for using the SYSCFG.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 at the Windows Command Prompt (cmd.exe) using the **PKUNZIP.EXE** utility (not supplied with the Deployment Toolkit). By default, the **dtk-2.X-winpe-AXX.exe** files are extracted to the root directory of your local hard drive, for example, **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-2.**X**-winpe-**AXX**.exe** from the Dell Support website at **support.dell.com** and save it on a system running a supported Windows operating system.

2   After the zip file downloads, double-click the file.

3   Click **OK**.

4   Click **Unzip**.

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

## Creating a Bootable Windows PE 2005 ISO Image

📝 **NOTE:** See "Creating a Bootable Windows PE 2.0 ISO Image" on page 43 for information on creating a bootable CD for Windows PE 2.0.

### Integration of DTK Directory Structure in the Windows PE Build

This task involves a five-step process:

1   Integrating DTK tools and scripts: Copy the folder \**Dell** that you unzipped from the Dell-supplied zip file to **DellWinPEBuild**, or extract the Dell-supplied file directly into the Windows PE build.

2   Installing necessary drivers into Windows PE: Execute \**Dell\Drivers\DRIVERINST.BAT** with two required arguments:

   •   Path to **DellWinPEBuild**

   •   Path where the Dell-provided drivers are located. These drivers can be found in the DTK zip file under the \**Dell\drivers** folder.

3   Adding support for mass storage drivers into Windows PE:

    📝 **NOTE:** You must implement this step to ensure mass storage drivers are installed into Windows PE.

    In the **winpeoem.sif** file (available under **I386\SYSTEM32** in your Windows PE directory), edit the following text to remove the semicolons from the `Oem Driver Params` section and append the directory names for the Dell-mass storage drivers:

```
OemDriverRoot=""
OemDriverDirs=MRAID, PERC4IM, PERC5, SAS5
```

**NOTE:** For your reference, a sample winpeoem.sif file is available under **\Dell\Toolkit\template\Configs**.

4 Starting required services: The **mr2kserv** service should be installed and started for RAID to function; the **racsvc** service should be installed and started for RACADM to function. For details on how to start the required services, see the sample **winbom.ini** file under **\Dell\Toolkit\template\Configs**.

**NOTE:** When booting the target system, ensure that the RAC and the **mr2kserv** services are running.

5 Extracting the following files from your Windows Server 2003 product CD to **\Dell\Toolkit\Tools**:

- rpcns4.dll
- rpcrt4.dll
- rpcss.dll

**NOTE:** The directory name should not have any spaces.

You can now customize the Windows PE according to your requirements.

### Creating a Bootable CD

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

1 Create a directory, **WinPE_OPKTools**, on your hard drive.

2 Insert the Windows OEM Preinstallation Kit (OPK) CD into your CD drive.

3 Copy all CD files from the Windows PE directory to the **WinPE_OPKTools** directory.

4 Copy **factory.exe** and **netcfg.exe** from the *CD drive* \tools\x86 directory to the **WinPE_OPKTools** directory.

5 Remove the CD from the CD drive.

6 Create and name a directory on your development system hard drive. This is where the ISO file is stored.

7 Navigate to the **WinPE_OPKTools** directory through a command prompt.

8 Run the following command:

```
OSCDIMG -bETFSBOOT.COM -n <DELLWINPEBUILD>
```

ETFSBOOT.COM is part of the OPK tools and makes the Windows PE CD bootable. The following command line creates a bootable ISO image called Dellx86winpe.iso:

```
C:\WINPE_OPKTOOLS\OSCDIMG -bETFSBOOT.com -n
c:\DELLWINPEBUILD
```

```
C:\FINALBUILD\Dellx86winpe.iso
```

9 Copy the SYSCFG.EXE utility to the root of the directory.

10 After you create an ISO image, you can use any CD-burning software to burn the image onto a CD.

You are now ready to use your bootable CD to configure the BMC on a managed system. See the *Deployment Toolkit User's Guide* for additional information.

## Creating a Bootable Windows PE 2.0 ISO Image

If you are using Windows PE 2.0, download Windows Administrative Installation Kit (WAIK) from the Microsoft website. By default, WAIK is copied to the **C:\Program Files\Windows AIK** directory.

### Integration of DTK Directory Structure in Windows PE Build

DTK provides a script, **VPE_driverinst.bat**, to pre-install the Dell drivers into a base Windows PE 2.0 image offline. Use the following steps to execute this script:

1 Open a command prompt on your system and change the directory to the location of VPE_driverinst.bat. For example:

```
cd C:\Dell\Drivers\winpe2.x
```

2 Execute VPE_driverinst.bat with two required arguments **<WINPEPATH>** and **<DTKPATH>**. For example:

```
VPE_driverinst.bat <WINPEPATH> <DTKPATH>
```

Where **<WINPEPATH>** is the destination path to create the directory structure for Windows PE 2.0 and **<DTKPATH>** is the path to Dell drivers in the extracted DTK toolkit. For example:

```
VPE_driverinst.bat C:\vistaPE_x86 C:\DELL\DRIVERS
```

**NOTE:** *<WINPEPATH>* is passed as the destination to the WAIK command `copype.cmd`. The destination folder **C:\vistaPE_x86** is created as part of the process, and should not already exist.

### Creating a Bootable CD

Use the following steps to create bootable media:

**1** Click **Start**, navigate to **All Programs→ Microsoft Windows AIK**.

**2** Click **Windows PE Tools Command Prompt** to open a command prompt window.

**3** Run the following command:

```
oscdimg -n -bc:\vistaPE_x86\etfsboot.com
c:\vistaPE_x86\ISO c:\vistaPE_x86\WinPE2.0.iso
```

This command creates a CD bootable ISO image called WinPE2.0.iso.

**4** You can use any CD burning software to burn the image onto a CD.

You are now ready to use your bootable CD to configure the BMC on a managed system. See the *Deployment Toolkit User's Guide* for additional information.

## Installation and Setup for Linux Operating Systems

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

**1** Obtain the ISO image of embedded Linux available on the Dell Support website at **support.dell.com**.

**2** Burn the ISO image using any commonly available CD burning software.

**NOTE:** When you create a bootable CD, this image is supplied to the CD burning software along with the complete deployment directory structure, which includes all necessary supporting files to perform the deployment.

**3** The CD burning software creates an image of the self-bootable ISO image and the deployment files on the CD.

**4** Extract the contents of the ISO image to a folder on your hard drive.

**5** Copy your custom scripts into the folder you created in step 4.

> **NOTE:** Your scripts should also take care of copying miscellaneous items to unlock the CD, so that the CD can be mounted and ejected as required by the operating system's installation process.

**6** In `/mnt/cdrom/isolinux.cfg`, the cd install section points to your customized start-up script.

> **NOTE:** The scripts that you copy into the CD will be copied to and run from the RAM disk. This task is done to ensure the CD is not locked. Ensure that your sample scripts have valid path names.

**7** Copy the directory structure created in your work station, into the root folder that you created in "step 4".

**8** This folder contains the DTK CD files necessary for operating system installation, and files required for replication.

**9** Use the **isolinux** utility to burn the contents of the folder you created in "step 7" to a CD and make it bootable.

**10** Your ISO image is ready for booting.

## Basic configuration

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 Deployment Toolkit SYSCFG 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 User's Guide* for additional information about installing and using the Deployment Toolkit utilities, and the *Command Line Interface Reference Guide* for a complete list of valid options, suboptions, and arguments for using the SYSCFG utility to configure and manage your BMC.

### Configuring New BMC Users

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

**1** Insert the 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:

```
syscfg username --userid=X --name=name
```

where X is a number between 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:

```
syscfg 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:

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

where *password* is an ASCII string of 16 or fewer characters for both PowerEdge *x8xx* and *x9xx* systems.

⚠ **CAUTION: 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.

**5** To configure BMC user privilege, at the command prompt, type:

```
syscfg lanuseraccess --usrprivlmt=bmcuserprivilege
where bmcuserprivilege=user, operator,
administrator, noaccess
```

Press <Enter> to execute the command-line options.

### Configuring the BMC IP Address

**1** Insert the Deployment Toolkit 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:

```
syscfg lcp --ipaddrsrc=dhcp
```

Press <Enter> to execute the command line options.

For a complete list of valid options, suboptions, and arguments for configuring the BMC LAN channel see the *Deployment Toolkit 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:

```
syscfg 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 valid options, suboptions, and arguments for configuring the BMC LAN channel see the *Deployment Toolkit Command Line Interface Reference Guide*.

### Configuring the BMC Serial Channel Access

1   Insert the 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:

```
syscfg scp --connectionmode=basic --
msgcommbitrate=XXXXX
```

where *XXXXX* is the baud rate in bps.

Press <Enter> to execute the command line options.

3   To configure the terminal mode for BMC, at the command prompt, type:

```
syscfg scp --connectionmode=terminal --
msgcommbitrate=XXXXX
```

where *XXXXX* is the baud rate in bps.

Press <Enter> to execute the command line options.

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

# Configuring Your BMC Using Server Administrator

You can also configure the BMC options using Server Administrator Version 5.3 or later, 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 *Dell OpenManage Server Administrator 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.

The Server Administrator Instrumentation Service allows you to manage 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 **Remote Access** object.
5 The **BMC Information** window is displayed.
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.

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

### Configuring BIOS in Server Administrator

To configure BIOS in Server Administrator, complete the following steps:

**1** Click the **System** object.

**2** Click the **Main System Chassis** object.

**3** Click the **BIOS** object.

**4** Click the **Setup** tab.

In the **Setup** tab, you can configure **Console Redirection** and **Serial Port communication** parameters.

## Using Dell Remote Access Controller 5

The Dell Remote Access Controller (DRAC) 5 provides a Web-based interface and RACADM (a command-line interface) that enables you to configure the DRAC 5 properties and users, perform remote management tasks, and troubleshoot a remote (managed) system for problems.

### Configuring the Network and IPMI LAN Settings

✎ **NOTE:** You must have **Configure DRAC 5** permission to do the following steps.

✎ **NOTE:** Most DHCP servers require a server to store a client identifier token in its reservations table. The client (DRAC 5, for example) must provide this token during DHCP negotiation. For RACs, the DRAC 5 supplies the client identifier option using a one-byte interface number (0) followed by a six-byte MAC address.

✎ **NOTE:** If your managed system DRAC is configured in Shared or Shared with Failover mode and the DRAC is connected to a switch with Spanning Tree Protocol (STP) enabled, network clients will experience a 20- to 30-second delay in connectivity when the management station's LOM link state changes during the STP convergence.

**1** Access the DRAC 5 Web-based interface. See the *Dell Remote Access Controller 5 User's Guide* for more information.

**2** Click **Remote Access** in the **System** tree.

**3** Click the **Configuration** tab and then click **Network**.

**4** Configure the DRAC 5 NIC settings in the **Network Configuration** page. Table 2-1 describes the Network Settings and IPMI Settings on the **Network Configuration** page.

**5** Click **Apply Changes** when completed.

**6** Click the appropriate **Network Configuration** page button to continue.

### Adding and Configuring DRAC 5 Users

Create unique users with specific administrative permissions (or role-based authority) to manage your system with the DRAC 5 and maintain system security. For additional security, you can also configure alerts that are e-mailed to specific users when a specific system event occurs.

*✍* **NOTE:** You must have Configure DRAC 5 permission to do the following steps.

**1** Expand the System tree and click **Remote Access**.

**2** Click the **Configuration** tab and then click **Users**. The **Users** page appears, which includes each user's State, RAC Privilege, IPMI LAN Privilege, and IPMI Serial Privilege.

**3** Click a user ID number in the User ID column.

**4** Configure the user's properties and privileges in the **User Configuration** page.

**5** Click **Apply Changes** when completed.

**6** Click the appropriate **User Configuration** page button to continue.

See the *Dell Remote Access Controller 5 User's Guide* for more information on the IPMI user privileges, DRAC group permissions, and the DRAC user privilege settings.

# 3

# Using the BMC Management Utility

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

- Command Line Interface (IPMI Shell and IPMItool)

  Both IPMI Shell and IPMItool are scriptable console application programs used for the control and management of remote systems using the IPMI version 1.5 and later protocol. IPMI Shell supports both serial access and LAN access to the BMC. IPMItool supports only LAN access to the BMC.

  The IPMI Shell can be used either in the generic CLI mode or the interactive mode. The interactive mode allows for a dedicated connection to a server and availability of all commands from the operating system CLI. Using the IPMI Shell in this mode improves usability and reduces time and traffic required for connecting and authenticating. The IPMItool can only be used in the CLI mode.

  Both IPMI Shell and IPMItool allow administration of one or more managed systems from a command line shell, rather than a graphical user interface (GUI). Use the IPMI Shell or IPMItool to perform the following tasks:

  - System power management
  - System identifier control
  - Access to the event log
  - Access to the system sensors
  - Enable Serial-over-LAN for a remote managed system

- 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 protocols. Any standard telnet client application, such as HyperTerminal on Microsoft Windows or telnet on Linux, can be used to access the daemon's features. SOL can be used either in the menu mode or command mode. 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 Linux serial console and Microsoft's EMS/SAC interfaces can also be accessed over a LAN using SOL.

⚠ **CAUTION: 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's *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.

📝 **NOTE:** The Windows "telnet" command that is run from a MS-DOS prompt supports ANSI terminal emulation, and the BIOS needs to be set for ANSI emulation to display all the screens correctly.

📝 **NOTE:** In future releases, IPMItool will replace IPMI Shell (IPMISH) and SOL Proxy utilities.

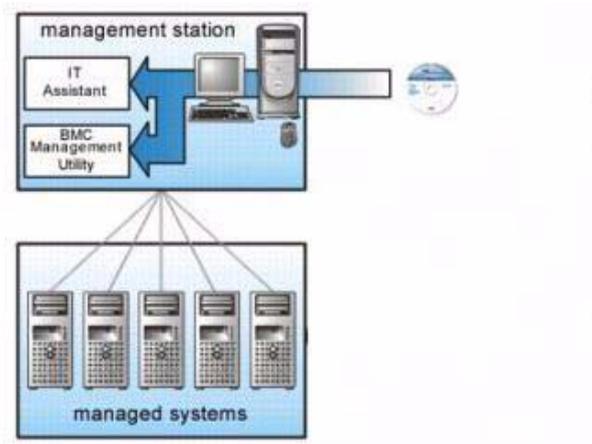# Installing the BMC Management Utility

The BMC Management Utility is installed on a management station 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" on page 25.

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**



# 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 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 in with administrator privileges to the system where you want to install the systems management software components.

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

3   Insert the *Dell Systems Management Tools and Documentation* DVD into your system's DVD drive.

    If the DVD 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 DVD drive).

    The **Dell OpenManage Management Station Installation** 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 menu, 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**.

💾 **NOTE:** Enable the virus scanning software after installation.

See the *Dell OpenManage Installation and Security 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 reboot the system (SOL Proxy automatically starts on a reboot). To restart the SOL Proxy service on Windows systems, complete the following steps:

**1** Right-click **My Computer** and click **Manage.** The **Computer Management** window is displayed.

**2** Click **Services and Applications** and then click **Services.** Available services are displayed to the right.

**3** Locate **DSM_BMU_SOLProxy** in the list of services and right-click to start the service.

## 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 Linux Enterprise Operating Systems

To install the BMC Management Utility on a management station running the Linux operating system:

1 Log in as root to the system where you want to install the management station components.

2 If required, mount the appropriate media supplied by Dell using the command:

```
mount /mnt/cdrom
```

3 Install the BMC Management Utility with the following command for SUSE Linux Enterprise server:

```
rpm -ivh /linux/bmc/osabmcutil9g-SUSE*.rpm
```

or for Red Hat Enterprise Linux, use the following command:

rpm -ivh /linux/bmc/osabmcutil9g-RHEL*.rpm

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

**/etc/init.d/SOLPROXY.cfg**

**/etc/SOLPROXY.cfg**

**/usr/sbin/dsm_bmu_solproxy32d**

**/usr/sbin/solconfig**

**/usr/sbin/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
```

```
dsm_bmu_solproxy32d start
```

```
dsm_bmu_solproxy32d stop
```

```
solproxy restart
```

### Uninstalling on Systems Running Supported Linux Enterprise Operating Systems

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

**1** Log in as `root`.

**2** Enter either of the following commands to remove all the installed packages from SUSE Linux Enterprise Server or Red Hat Enterprise Linux.

```
rpm -e osabmcutil9g-SUSE*

rpm -e osabmcutil9g-RHEL*
```

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 GUI. 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 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 logged events.
- Display current status of platform sensors.
- Enable or disable SOL.

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 power 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).
- Clear the system event log (SEL).
- Turn the blinking system identification LED on or off.

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" on page 113 for a complete list of possible BMC Management Utility error codes.

**Figure 3-2. IPMI Shell Diagram**
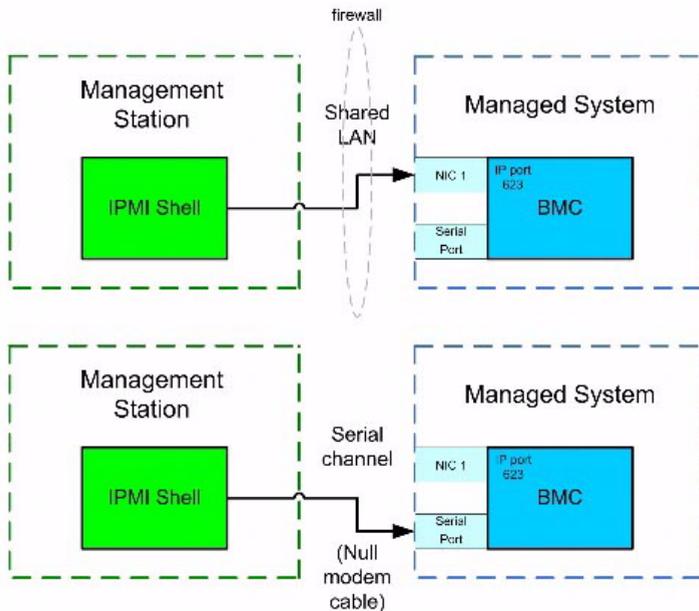
## Using IPMI Shell

To use IPMI Shell, perform the following steps:

On systems running a supported Microsoft Windows operating system:

   **1** Start a **Command Prompt** window.

   **2** Locate the **ipmish.exe** file. By default, **ipmish.exe** is located in the directory: **C:\Program Files\Dell\SysMgt\bmc.**

   **3** Enter IPMI Shell commands (see "IPMI Shell Command Syntax" on page 59) to manage the remote system. See "IPMI Shell Commands" on page 66 for a complete list of valid options, commands, subcommands, and arguments.

On systems running a supported Linux operating system:

   **1** Start an operating system (OS) shell.

   **2** Enter IPMI Shell commands (see "IPMI Shell Command Syntax" on page 59) to manage the remote system. See "IPMI Shell Commands" on page 66 for a complete list of valid options, commands, subcommands, and arguments.

   **NOTE:** The IPMI Shell will be located in **/usr/sbin**.

## IPMI Shell Command Syntax

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

```
ipmish [global-options] … command [; command] …
```

The general usage for a command is:

```
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:

### Running IPMISH over LAN Option `-ip`

**Synopsis**

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

```
[-k KG value] <command>
```

**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.

**NOTE:** This global option cannot be used independently to connect to the BMC. One or more IPMISH commands must follow the option.

**Options**

```
-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.

```
-k KG value
```

Specifies the KG value in Hex format. The IPMI encryption key is a public key used to generate an encryption key for use between firmware and application. It is differentiated from a password, which is not public and is used to access the firmware. The maximum value is 20 ASCII hex pairs with no spaces between the pairs.

**NOTE:** Even number of hexadecimal characters is valid and odd number of hexadecimal characters is invalid. For example, 123456AB67 is valid, and 123 is invalid. Enter 00, 0000, and so on to disable encryption.

**NOTE:** The IPMI encryption key is available only on Dell *x9xx,xx0x* and *xx1x* systems.

**Running IPMISH over Serial – Option –com**

*Synopsis*

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

The following attributes should be configured for IPMISH over serial to function correctly.

**NOTE:** These options can be configured in BIOS Setup, as well as using Dell OpenManage tools. Log on to Server Administrator and navigate to BIOS Setup.

- "External Serial Connector" must be configured and set to "Remote Access" for PowerEdge *x9xx*, *xx0x*, and *xx1x* systems. This option is available in the "Serial Communication" submenu in BIOS setup.

- Disable the "RAC serial Console" if you have a DRAC 5 card installed. Log on to the DRAC GUI, navigate to Serial and deselect the "Enable Serial console" checkbox.

- Set "Serial port 1" to "BMC Serial" for PowerEdge *x8xx* systems. This option is available under the Integrated Devices menu in BIOS Setup.

The Serial communication connection mode for the BMC must be set to "Direct Connect Basic Mode" for all systems. This can be configured using Server Administrator. Log on to Server Administrator and navigate to Serial Port.

*Description*

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

**NOTE:** This global option cannot be used independently to connect to the BMC. One or more IPMISH commands must follow the option.

## Options

`-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 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. The maximum reliably supported baud rates are:

- 19200 for PowerEdge *x8xx* systems
- 57600 for PowerEdge *x9xx* and *xx0x* systems without Dell Remote Access Controller 5 (DRAC 5)
- 115200 for PowerEdge *x9xx* and *xx0x* systems with DRAC 5
- 115200 for PowerEdge *xx1x* systems

**NOTE:** The baud rate for 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 subcommand
```

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**

**Figure 3-4. IPMISH Help option Example 2**



```
C:\WINNT\system32\cmd.exe                                        _ □ X

Basic Usage Examples:

1. Display general system info of remote server using LAN connection:
   "ipmish -ip 192.168.0.100 -u root -p calvin sysinfo"

2. Display general system info of remote server using serial connection:
   "ipmish -com 1 -baud 19200 -flow cts -u root -p calvin sysinfo"
   "ipmish -com ttyS0 -baud 19200 -flow cts -u root -p calvin sysinfo"

3. Turn on/off identification LED that exists on the server:
   "ipmish -ip 192.168.0.100 -u root -p calvin identify on"
   "ipmish -ip 192.168.0.100 -u root -p calvin identify off"

4. Power cycle the remote server:
   "ipmish -ip 192.168.0.100 -u root -p calvin power cycle"

5. Display system event log messages:
   "ipmish -ip 192.168.0.100 -u root -p calvin sel get"


For detailed subcommand help, type "ipmish -help <subcommand>".
Example: "ipmish -help power"

C:\Program Files\Dell\SysMgt\bmc>_
```
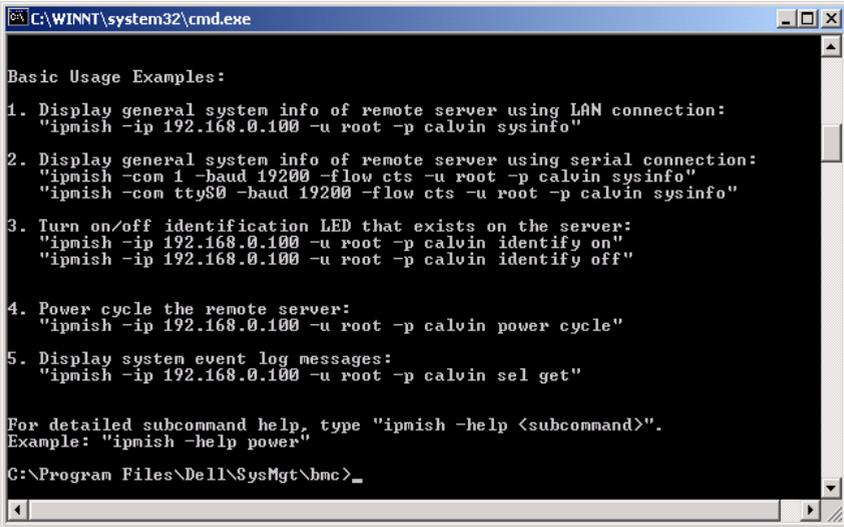
**IPMI Session Option `-interactive`**

*Synopsis*

```
ipmish -interactive [-cfg <config_file>]
```

*Description*

This option invokes the interactive CLI mode. An IPMISH prompt appears when entering interactive CLI mode. Type quit to exit the IPMISH prompt and return to the CLI prompt.

✎ **NOTE:** The command prompt responds with an error message in the interactive mode, if a command is used before establishing an IPMI session with **connect.**

*Options*

```
-interactive
```

Invokes the interactive CLI mode.

```
-cfg <config_file>
```

Specifies the configuration file for BMU to start the CLI mode with. If a configuration file is not specified, BMU operates with default configuration settings.

> **NOTE:** The `-interactive` option must be followed by `connect` for ipmish to work.

See "Configuring the SOL Proxy Configuration File" on page 93 for more information on configuration files.

**Figure 3-5.   IPMISH interactive option**



The following line edit functions are supported during the interactive session:

1   Up and Down arrow keys to browse command history.

2   Left and Right arrow keys to move the input cursor.

3   Home and End keys to move the input cursor to the beginning or end of the line.

4   Backspace key to move the input cursor back by one space.

The following line edit functions are supported for the SOL proxy menu mode:

1   Left and Right arrow key to move the input cursor.

2   Home and End keys to move the input cursor to the beginning or end of the line.

3   Backspace key to move the input cursor back by one space.

## IPMI Shell Commands

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

*Ø* **NOTE:** The `sol`, `sensor`, and `connect` commands can be used in the IPMI Shell interactive and non-interactive modes and the quit command can be used only in the interactive mode.

**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. |
| sol | Enables Serial-over-LAN for the remote managed system. |
| sensor | Displays current status of platform sensors. |
| LCD | Displays information on and helps configure the LCD panel in Dell *x9xx*, *xx0x*, and *xx1x* systems. |
| powermonitor | Displays information on and helps manage your system's power. |
| connect | Connects to the BMC of the remote managed system. |
| help | Displays a command list with descriptions and syntax of options. |
| quit | Exits the command prompt. |

### identify

*Synopsis*

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

*Description*

This command controls the identification LED on the front panel. See Figure 3-6.

### 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.

**NOTE:** Acknowledgement or status check of the command is not displayed on the command prompt. You should manually check the status on the system.

### 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 3-6. identify Option Example**
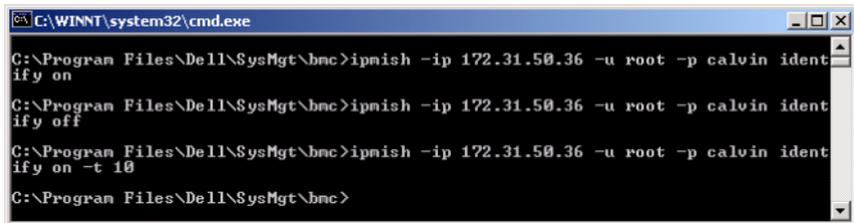


### sysinfo

### 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 3-7 and Figure 3-8.

## 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 3-7.

**Figure 3-7.    sysinfo Option Example**



**Figure 3-8.    sysinfo FRU Example**
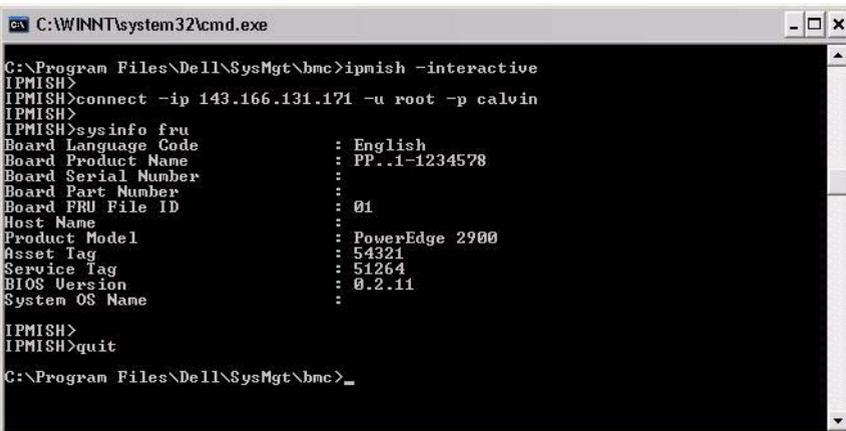
**power**

### 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 3-9.

### 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:** This reboot feature mimics restarting the system using the server's power button. A graceful shutdown of the server operating system may not be possible when the server software stops responding, or if the local security policy of the operating system does not allow a graceful shutdown. In these cases, specify a forced reboot instead of graceful reboot of Windows.

- `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 and holding the power button for four or more seconds.

### Default Subcommand

If a subcommand is not specified, this command functions the same as **power status**.

**Figure 3-9. Power Option Example**



```
C:\WINNT\system32\cmd.exe                                              _□×
C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin power
 status
Status= on

C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin power
 off -force

C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin power
 status
Status= off

C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin power
 on

C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin power
 status
Status= on

C:\Program Files\Dell\SysMgt\bmc>ipmish -ip 172.31.50.36 -u root -p calvin power
 cycle

C:\Program Files\Dell\SysMgt\bmc>ipmish -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] [-format <oemlist|legacy>]
```

### sel clear

#### *Description*

This command displays the system event log information, displays the contents of the event log, and deletes all the event log records. See Figure 3-10.

#### *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 either a tabular format (legacy) or a vertical format (oemlist) consistent with the SEL log output found in other Dell OpenManage products. The default is the oemlist format. The column headers for the legacy format are: **Ordinal Number**, **Date**, **Time**, **Sensor Number**, **Sensor Type**, and **Brief Description**. See Figure 3-10 for an example of oemlist and legacy formatted SEL display.

**Figure 3-10.    sel Option Example**
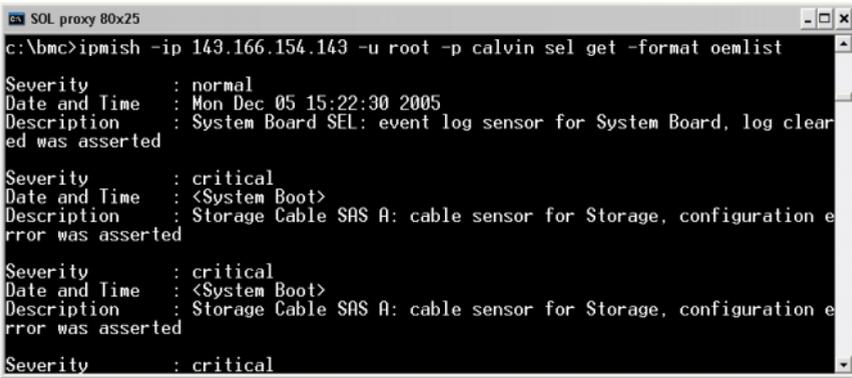


```
SOL proxy 80x25                                                    _ □ ×
c:\bmc>ipmish -ip 143.166.154.143 -u root -p calvin sel get -format oemlist

Severity        : normal
Date and Time   : Mon Dec 05 15:22:30 2005
Description     : System Board SEL: event log sensor for System Board, log clear
ed was asserted

Severity        : critical
Date and Time   : <System Boot>
Description     : Storage Cable SAS A: cable sensor for Storage, configuration e
rror was asserted

Severity        : critical
Date and Time   : <System Boot>
Description     : Storage Cable SAS A: cable sensor for Storage, configuration e
rror was asserted

Severity        : critical
```

## SOL

### *Synopsis*

```
sol[enable |disable]

sol config [-baud baud_rate][-priv privilege_level]
[-retry count retry_count] [retry interval
retry_interval]
```

### *Description*

This command allows you to configure sol session parameters of a remote BMC.
See Figure 3-11.

**NOTE:** The command prompt responds with an error message if a command is
used before establishing an IPMI session with **connect.**

### *Subcommands*

- `enable` — Allows you to enable SOL of connected server.
- `disable` — Allows you to disable SOL of connected server.
- `config` — Allows you to configure SOL baud rate and privilege level.

## Options

- `-baud baud_rate`

   Specifies the communication baud rate over the serial channel, such as 9600 or 19200. It should be in conformity with the SOL baud rate of the managed server.

- `-priv privilege_level`

   Specifies minimum privilege levels required to establish an SOL session. Possible values are User, Operator, and Administrator.

- `-retry count retry_count`

   Specifies number of times the BMC will retry sending SOL packages if no acknowledgement is received. The maximum and minimum values are 7 and 0, respectively.

- `-retry interval retry_interval`

   Specifies the retry time interval that the BMC will wait before resending SOL packets to the remote console. It is specified in 10 ms increments. For example, if you set 100 as the value, the BMC will wait 1000 ms before retrying to send SOL packages to the remote console. If you specify zero as the value, the BMC will retry sending instantly, without any time intervals.

**Figure 3-11.   IPMISH SOL option**



```
C:\WINNT\System32\cmd.exe - ipmish -interactive                            _ □ ×

C:\Program Files\Dell\SysMgt\bmc>ipmish -interactive
IPMISH>connect -ip 143.166.131.171 -u root -p calvin
IPMISH>sol

Status: Serial-Over-LAN Enabled.
Current settings:
              Retry Count:7
              Retry Interval:100
              Baud Rate:57.6K
              Minimum required privilege:admin
IPMISH>
```

**sensor**

*Synopsis*

```
sensor [temp|fan|volt|discrete|numeric][-format
<oemlist|legacy>]
```

*Description*

This command displays the current status of platform sensors using one of the two possible formats. See Figure 3-12.

*OPTIONS*

```
[temp|fan|volt|discrete|numeric]
```

Specifies the sensor group (temp, volt, fan, discrete, or numeric) for which information is displayed. If you do not specify a sensor group, all sensors for which there is information will be displayed.

```
-format <oemlist|legacy>
```

Use different formats to output the sensor data. Default format is oemlist. Legacy format is displayed as below:

```
Sensor Name | Sensor Type | Sensor # | Status [| Value
| Units]
```

*Subcommands*

```
[temp | fan | volt | discrete | numeric]
```

Specifies the sensor group for which information is displayed. If no sensor group is specified, information is displayed for all groups.

**Figure 3-12.    Sensor option example**
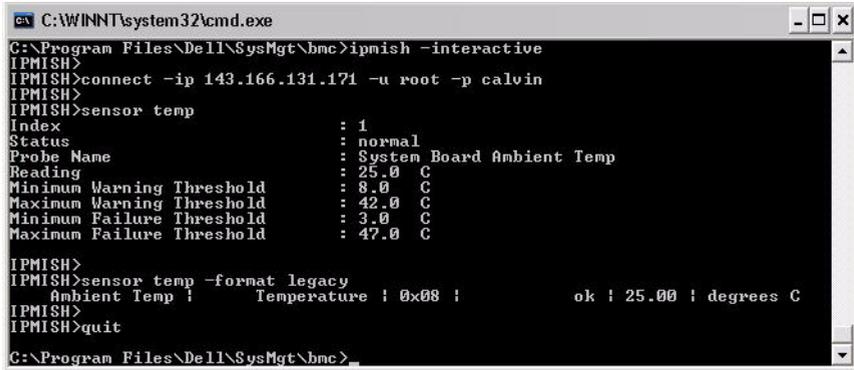


```
C:\WINNT\system32\cmd.exe                                              -□×
C:\Program Files\Dell\SysMgt\bmc>ipmish -interactive                      ▲
IPMISH>
IPMISH>connect -ip 143.166.131.171 -u root -p calvin
IPMISH>
IPMISH>sensor temp
Index                        : 1
Status                       : normal
Probe Name                   : System Board Ambient Temp
Reading                      : 25.0   C
Minimum Warning Threshold    : 8.0    C
Maximum Warning Threshold    : 42.0   C
Minimum Failure Threshold    : 3.0    C
Maximum Failure Threshold    : 47.0   C

IPMISH>
IPMISH>sensor temp -format legacy
    Ambient Temp !       Temperature : 0x08 !          ok ! 25.00 ! degrees C
IPMISH>
IPMISH>quit

C:\Program Files\Dell\SysMgt\bmc>_                                         ▼
```

**connect**

**Synopsis**

```
connect -ip bmc_ip_address | bmc_hostname [-u
username] [-p password] [-k IPMI encryption key value]

connect -com bmc_ip_address | bmc_hostname -u username
-p password

[-k KG value] <command>
```

**Description**

This command establishes an IPMI connection with the remote server in the interactive mode to enable the user to perform server management activities. The command remains active until the user quits the command prompt or uses the command again to connect to a different server. See Figure 3-13.

**Options**

```
-ip bmc-ip-address|bmc_hostname
```

Specifies the out-of-band IP address or hostname of the remote managed system.

```
-u username
```

Specifies the username to connect to the remote system.

```
-p password
```

Specifies the password to be used to connect to the remote managed system.

```
-k IPMI encryption key value
```

Specifies the KG value in Hex format. The IPMI encryption key is a public key used to generate an encryption key for use between firmware and application. It is differentiated from a password, which is not public and is used to access the firmware. The maximum value is 20 ASCII hex pairs with no spaces between the pairs.

> ✎ **NOTE:** Even number of hexadecimal characters is valid and odd number of hexadecimal characters is invalid. For example, 123456AB67 is valid, and 123 is invalid. Enter 00, 0000, and so on to disable encryption.

**Figure 3-13.    IPMISH connect option**
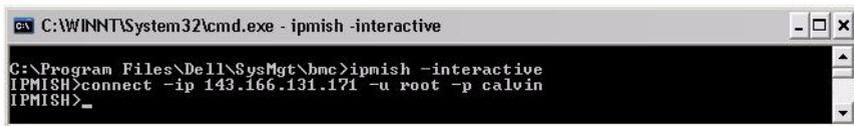


**LCD**

*Synopsis*

```
LCD info
```

*Description*

This command displays the status of the LCD display on a *x9xx*, *xx0x*, or *xx1x* system. You can also configure the LCD display using this command.

*Subcommands*

- `info` — Displays information about the LCD display.
- `set` — Sets LCD display to either `none`, `default`, `other`. Choose `other` to set a string of your choice.
- `none` — Turns the LCD display off.
- `default` — Sets the default display on the LCD.

### Default Subcommand

If a subcommand is not specified, this command functions the same as `LCD info`.

### powermonitor

#### Synopsis

`powermonitor status`

#### Description

This command displays the current power status of the managed system.

#### Subcommands

- `status` — Displays the current power status of the system. The returned values denote energy consumption, peak power (in Watts), and peak amperage.
- `clear peakpower` — Deletes the peak power value.
- `clear cumulativepower` — Deletes the cumulative power values.

#### Default Subcommand

If a subcommand is not specified, this command functions the same as **power status**.

### quit

#### Synopsis

`quit`

#### Description

This command exits the IPMI Shell interactive mode and returns to the command mode.

**help**

### *Synopsis*

```
help [command]
```

### *Description*

This command lists commands and capsule descriptions with syntax for each command. See Figure 3-14.

### *Argument*

```
command
```

Specifies the command for which detailed description is required.

**Figure 3-14.    IPMISH help option**
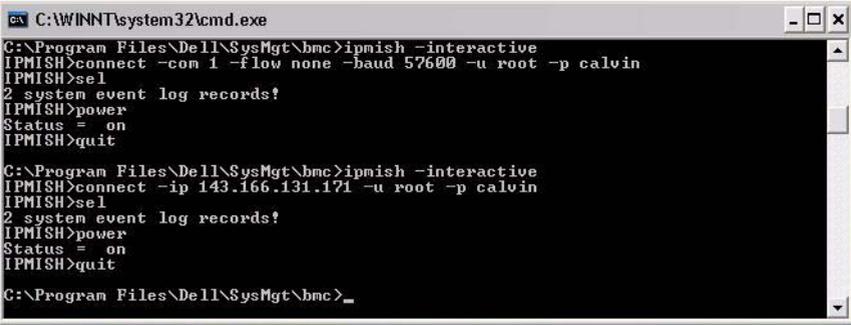


# SOL Proxy

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 3-15. 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 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's *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 3-15.  SOL Proxy Diagram**
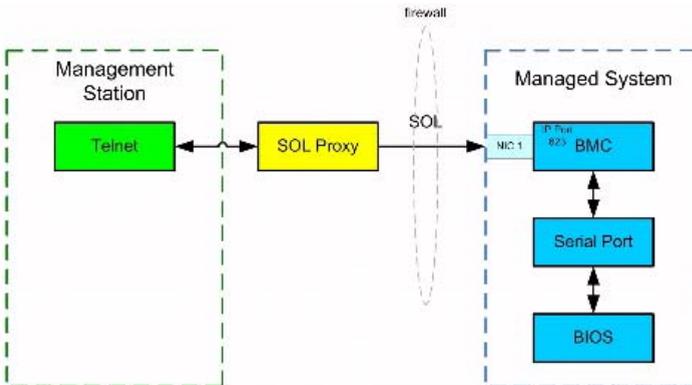


The SOL Proxy communication scheme enables you to view and configure the BIOS settings of a managed system, as well as to reset the managed system remotely using a telnet client. SOL Proxy is installed as a daemon service and automatically starts each time the system boots. SOL Proxy can accommodate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

⚠ **CAUTION: 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.**

⚠ **CAUTION: SOL Proxy supports only local user login and not Active Directory
login. Authentication errors will result in case of Active Directory logins.**

> 📝 **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's *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 Linux environment, you can use a shell such as **csh** or **ksh** as your
  console, or you can use any telnet application supporting VT100 or ANSI
  emulation mode.

> 📝 **NOTE:** 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, you can send the
break signal through the Linux telnet modules by typing:

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

The Linux SysRq function is one example of an advanced debugging feature that is enabled by use of the break function. See the "BIOS Configuration" on page 25 on how to use this feature. See the "Serial Console redirection With SOL Proxy" on page 133 for more information on the SysRq feature.

To enable BIOS console redirection for use with SOLProxy:

- Configure the **Console redirection** attribute to **On with Console Redirection via COM2** for Dell *x9xx* and *xx0x*. For *xx1x* systems, configure the **Serial Communication** attribute to **On with Console Redirection via COM2**. This option is available under the **Serial Communication** submenu in BIOS setup.

- Configure the **Console Redirection** attribute to **Serial Port1** for PowerEdge *x8xx* systems. This option is available under the **Console Redirection** menu in **BIOS Setup**. Set **Serial Port 1** to **BMC NIC**. This option is available under the **Integrated Devices** menu in **BIOS Setup**.

## 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.

### Initiating the SOL Proxy session 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). 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 the SOL Proxy Configuration File" on page 93.

3  If you are prompted for a username, provide the operating system login credentials of the system running the service: DSM_BMU_SOLProxy.

**4** Provide a password when prompted. SOL Proxy will use this combination of operating system username and password to authenticate you on the 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, a login successful message and the SOL Proxy main menu prompt appear. You are ready to use SOL Proxy. By default, you will be logged in the menu mode. See "SOL Proxy Main Menu" on page 83 for further instructions.

The following line edit functions are supported during the SOLProxy session:

**1** Up- and down- arrow keys to browse command history.

**2** Left- and right- arrow keys to move the input cursor.

### Using a Linux Shell

To connect and use SOL Proxy:

**1** Open a 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 the SOL Proxy Configuration File" on page 93.

**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 the 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, a login successful message and the SOL Proxy main menu prompt appear. You are ready to use SOL Proxy. See "SOL Proxy Main Menu" on page 83 for further instructions.

### SOL Proxy Main Menu

After the telnet connection with SOL Proxy is successfully established, you are presented with the following choices. See Figure 3-16.

**Figure 3-16.  SOL Proxy Main Menu Example**
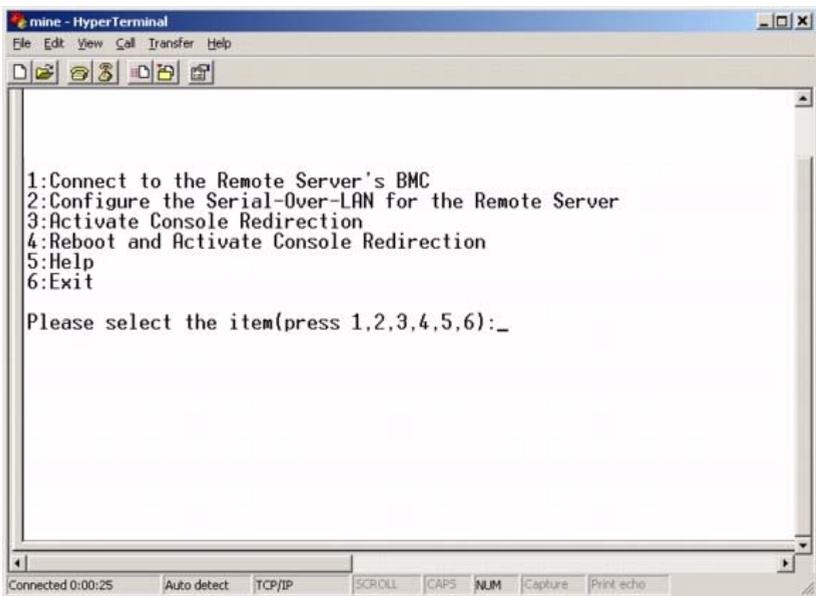


The SOL Proxy main menu allows you to change the SOL settings of a remote managed system's BMC, reboot the remote BMC, or activate console redirection.

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 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 $<\sim><.>$ 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" on page 25 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 3-17.

4 Provide the IPMI encryption key if it was configured in the BMC.

**Figure 3-17.   Connecting to the Remote System's BMC**

```
Please select the item(press 1, 2, 3, 4, 5, 6):1
Server Address:192.168.154.56
Username:root
Password:
Key:

SOLProxy Status:Connected.



Powered by Avocent
BMC Management Utility - SOL Manager v2.0 Release 25
Copyright 2005 - Avocent Corporation(http://www.avocent.com/dell/bmu)


Current connection:192.168.154.56:root

1:Connect to the Remote Server's BMC
2:Configure the Serial-Over-LAN for the Remote Server
3:Activate Console Redirection
4:Reboot and Activate Console Redirection
5:Help
6:Exit

Please select the item(press 1, 2, 3, 4, 5, 6):
```

**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, a username/password combination, and an IPMI encryption key. The IPMI encryption key value will be ignored if no key was set at the BMC on the target server. See "Connecting to the Remote Managed System's BMC" on page 84 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 3-18.

**Figure 3-18.    Configuring the Serial-Over-LAN for the Remote System, Example 1**
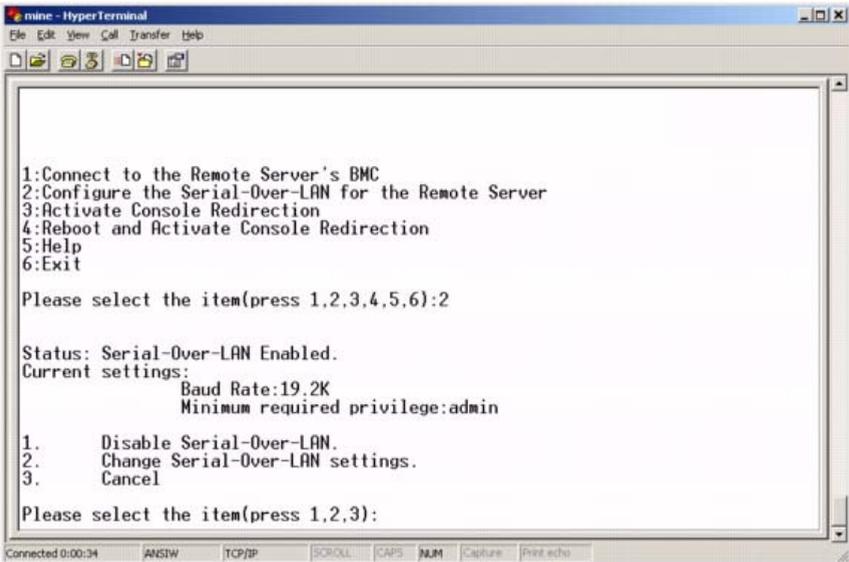


- If SOL is currently disabled, the options shown in Figure 3-19 are displayed. Type Y to enable SOL or N to keep SOL disabled. See Figure 3-19.

**Figure 3-19.   Configuring the Serial-Over-LAN for the Remote System, Example 2**
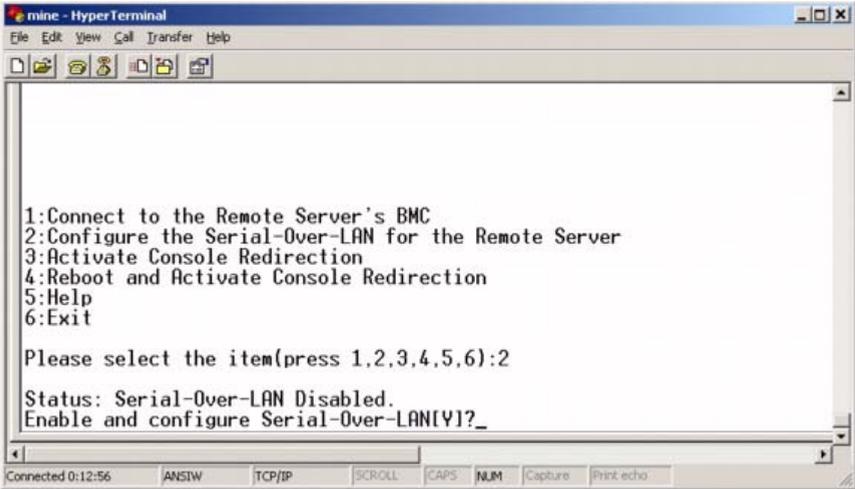


- If SOL is enabled, two BMC settings are displayed:

  – The communication baud-rate between the system serial port and the
    BMC

  – The minimum BMC user privilege level required for activating
    console redirection

  SOL 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 SOL settings are then displayed.
  See Figure 3-20.

**Figure 3-20.   SOL Settings, Example 3**
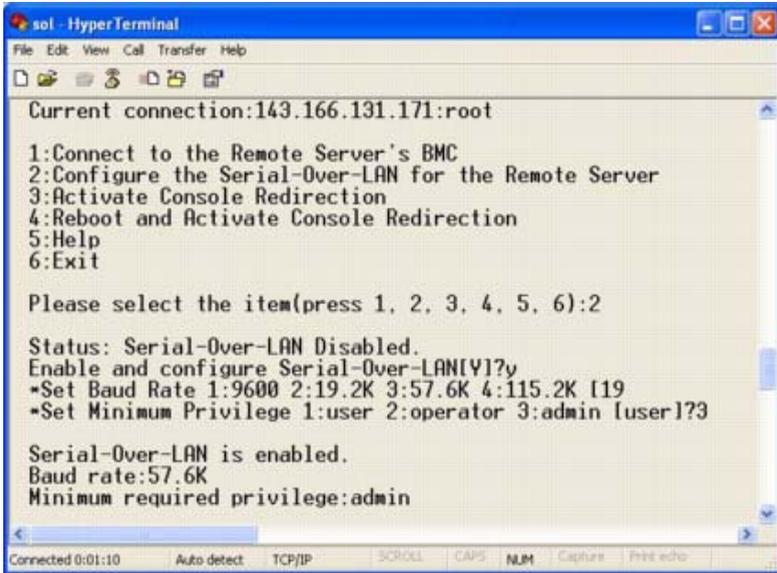


**Activating Console Redirection**

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" on page 84 for more information.

The remote managed system's text console is redirected to your management station. See Figure 3-21.

✐ **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" on page 25 for more information.

**Figure 3-21.    Console Redirection Example**
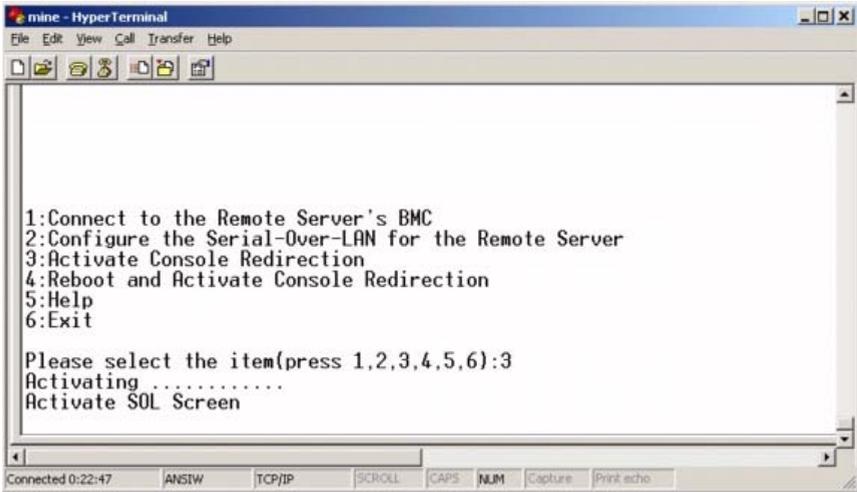


**Rebooting the Managed System and Activating Console Redirection**

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, a username/password combination, and an IPMI encryption key. The IPMI encryption key value will be ignored if no key was set at the BMC on the target server. See "Connecting to the Remote Managed System's BMC" on page 84 for more information.

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

> **NOTE:** This reboot feature mimics restarting the system using the server's power button. A graceful shutdown of the server operating system may not be possible when the server software stops responding, or if the local security policy of the operating system does not allow a graceful shutdown. In these cases, specify a forced reboot instead of graceful reboot of Windows.

Next, the power state is monitored until the status changes to on. 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 3-22.

**NOTE:** Before activating the console redirection, you must first enable the console redirection features. See "Configuring Your Managed System" on page 25 for more information.

**Figure 3-22.   Reboot Example**

```
Powered by Avocent
BMC Management Utility - SOL Manager v2.0 Release 25
Copyright 2005 - Avocent Corporation(http://www.avocent.com/dell/bmu)

Current connection:192.168.154.56:root

1:Connect to the Remote Server's BMC
2:Configure the Serial-Over-LAN for the Remote Server
3:Activate Console Redirection
4:Reboot and Activate Console Redirection
5:Help
6:Exit

Please select the item(press 1, 2, 3, 4, 5, 6):4

Power Status is ON.
Use graceful shutdown[Y]y
Attempting graceful shutdown...
Powering on...
Activating remote console now.
Remote console is now active and ready for user input.
```

**Getting Help**

Select option **5** in the main menu to display detailed descriptions for each option. See Figure 3-23.

**Figure 3-23.  Sample Help Screen**

```
1:    Connect to the BMC
         Establish a new IPMI session with a remote BMC. The IP address,
         and optionally the BMC username/password of the remote node are
         required. The key needs to match the key set at the remote BMC.
         If no key is set this field should remain blank. The privilege
         level of username determines the operations available to the
         user.

2:    Configure Serial-Over-LAN
         Console redirection must be enabled for a remote system before it
         can be activated. BMC administrators can use this option to disable
         or enable SOL. To enable SOL user must specify the serial port
         baud rate used by the system and the minimum privilege required for
         activating SOL.

3:    Activate Console Redirection
         Use this option to activate SOL for the connected BMC. SOL must
         be enabled before it can be activated. Your telnet client terminal
         emulation setting must match that of the remote server serial console
         for the result to be displayed correctly. ANSI PC or VT100 settings
         work well for most circumstances.

Press any key to continue
```

**Exit**

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

## Using SOL proxy in command mode

By default, SOL Proxy is installed for use in the menu mode by the system. See "Configuring the SOL Proxy Configuration File" on page 93 for instructions on how to change the default settings to command mode.

### Commands in SOL Proxy

SOL Proxy command mode is similar to the IPMI Shell interactive mode. In addition to supporting all commands of the IPMI Shell interactive mode, the SOL Proxy supports the following additional commands.

**console**

*Synopsis*

console

*Description*

This command allows users to establish an SOL session with the connected server.

📓 **NOTE:** BMU responds with an error message if **console** is used before establishing an IPMI session with **connect.**

**reboot**

*Synopsis*

reboot[-force]

*Description*

This command allows you to control power configurations and establish an SOL session in one atomic operation. It is equivalent to executing the menu command of "Reboot and Activate Console Redirection". See Figure 3-24.

*Options*

-force

This option is used to force the system to shut down. If this option is omitted, the "reboot" command is executed using a graceful shutdown.

**Figure 3-24.   reboot Option Example**
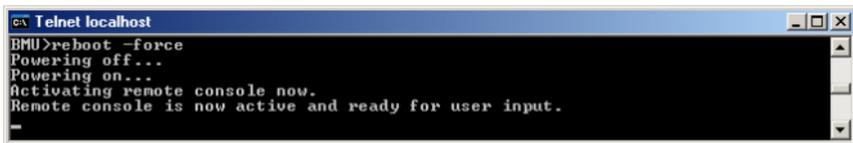
## Configuring the SOL Proxy Configuration File

Certain parameters, for IPMI Shell and SOL Proxy, must be correctly configured in the SOL Proxy Configuration file, - **SOLProxy.cfg**, which is located in the default installation BMC directory.

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

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 listens for input on any interface on the server.
*   **127.0.0.1** — SOL proxy listens for input on the localhost only.
*   **IP address** — SOL proxy listens for input on this IP address only.

For example:

```
ip=INADDR_ANY
```

### Port Binding

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

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**

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**

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**

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
```

**User Interface**

Specifies the default settings for SOL Proxy startup. The user can edit and set this comment in the command or menu mode. For example:

```
user_interface=menu
```

**Sol Loss Silent**

Specifies system behavior when one or more SOL packets are lost.
The possible values are 0 and 1. If it is set to 0 or is absent, the system will print an error message on the screen each time an SOL packet is lost. If it is set to 1, the system will not print error messages for loss of SOL packets. For example:

```
sol_loss_silent=0 or 1
```

**Sol Loss Threshold**

Specifies number of SOL packets that can be lost before SOL deactivation. The default value is 0, which means that the system will deactivate SOL, if any SOL packets are lost. For example:

```
sol_loss_silent_threshold=0
```

**Sdr Cache**

Specifies whether the system probe information is saved. This information enhances speed of providing sensor and System Event Log (SEL) data. The possible values are on and off. Default value is on. For example:

```
sdr_cache=on
```

**Sdrcache Path**

Specifies path where the system probe information is saved. Default location is the installed BMC directory on your hard drive. For example,

```
sdrcache_path=<specified path directory>
```

**Max Session**

Specifies the maximum number of concurrent SOL sessions possible.
This default value is 1; any value less than 1 will be ignored or treated as 1. You cannot set more than 20 sessions. For example:

```
max_session=2
```

**Logpath**

Specifies the path for storing the log files. Two log files, solproxy.log and solproxyipmi.log, are created at the specified path. For example,

```
logpath=<specified location for log file>
```

**debug**

Specifies if the debug data will be logged. The default is off.

```
debug=off
```

# IPMItool

IPMItool is a CLI utility that helps in configuring and managing devices using the IPMI version 1.5 and later protocol. IPMItool supports out-of-band (OOB) access (over a LAN) to a single system at a time. However, multiple IPMItool sessions can run simultaneously on the same managed system.

IPMItool allows a user with user-level BMC privileges to:

- Display the current power status.
- Display the 16-byte system GUID of the managed system.
- Display information from the system's FRU.
- Display the BMC firmware information.
- Display summary information about the system event log.
- Display logged events.
- Display current status of platform sensors.
- Enable or disable SOL.

*NOTE:* See the IPMItool man page available on the World Wide Web for a comprehensive list of features.

*NOTE:* While running ipmitool inband on Linux, if the OpenIPMI driver is not running by default, it may cause commands to fail. To start the OpenIPMI drivers, use the command `service ipmi start`. To set the system to start the driver automatically during boot, use `chkconfig ipmi on`.

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

- Power on, reset, or power 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).
- Clear the system event log (SEL).
- Turn the blinking system identification LED on or off.

To facilitate command scripting, upon successful execution, IPMItool 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" on page 113 for a complete list of possible BMC Management Utility error codes.

The complete list of commands listed under **delloem** in Table 3-2 are supported by the IPMItool.

### delloem

The delloem commands provide information on Dell-specific features.

Table 3-2 lists the delloem subcommands with a brief description.

📖 **NOTE:** The **vFlash info Card** command can be used only for in-band access.

**Table 3-2.    delloem Subcommands**

| Command | Description |
| --- | --- |
| lcd | Displays information on and helps configure the LCD panel in Dell *x9xx*, *xx0x*, and *xx1x* systems. |
| powermonitor | Displays power tracking statistics information. |
| sysinfo | Displays information about your system. |
| sel | Displays the system event log information. |
| sensor | Displays information on and helps manage your system's sensors. |
| mac | Displays information about the system NICs. |
| lan | Displays the NIC selection mode information. |
| windbg | Controls the debugging sessions. |
| vFlash info Card | Displays the vFlash SD card properties. |

**Options for LCD**

- lcd set {mode}|{lcdquallifier}|{errordisplay}
  - lcd set mode: Allows you to set the LCD mode and user defined string.

*Command Syntax:*

```
ipmitool -I lanplus -H <ipaddress> -U <user> -P
<password> -k <kgkey> delloem lcd set mode
{none}|{modelname}|{ipv4address}|{macaddress}|{sy
stemname}|{servicetag}|{ipv6address}|{ambienttemp
}|{systemwatt}|{userdefined}|<text>{assettag}
```

📝 **NOTE:** The `kgkey` (`-k` option in lanplus) is a string of 20 ASCII characters. This feature is enhanced for *xx1x* systems to support the `kgkey` in hex. The option is `-x` followed by a 40 character hex value. For the lanplus interface to work, ensure that this `kgkey` is the same as what is set on the *xx1x* system. Except for the default value, the 40 character hex `kgkey` should start with a non–zero value. If you enter a value less than 40 characters or any non-hex values, an error message displays.

- `lcd set lcdquallifier`: Allows you to set the unit for the system Watt and ambient temperature modes.

*Command Syntax:*

```
ipmitool -I lanplus -H <ipaddress> -U <user> -P
<password> -k <kgkey> delloem lcd set
lcdquallifier
{watt}|{btuphr}|{celsius}|{fahrenheit}
```

- `lcd set errordisplay`: Allows you to set the error display.

*Command Syntax:*

```
ipmitool -I lanplus -H <ipaddress> -U <user> -P
<password> -k <kgkey> delloem lcd set errordisplay
{sel}|{simple}
```

- `info`: Displays information about the LCD display.

*Command Syntax:*

```
ipmitool -I lanplus -H <ipaddress> -U <user> -P
<password> -k <kgkey> delloem lcd info
```

- `lcd set vkvm`: To set the vKVM status, *Active* or *Inactive*.

*Command Syntax:*

```
ipmitool -I lanplus -H <ipaddress> -U <user> -P
<password> -k <kgkey> delloem lcd set vkvm
{active}|{inactive}
```

- `lcd set frontpanelaccess`: Sets the LCD mode to view and modify, view only, or disabled.

  *Command Syntax:*

  ```
  ipmitool -I lanplus -H <ipaddress> -U <user> -P
  <password> -k <kgkey> delloem lcd set
  frontpanelaccess{viewandmodify}|{viewonly}|
  {disabled}
  ```

- `lcd status`: To view the vKVM status (Active or Inactive) and to view the front panel access mode (View and Modify, View Only, or Disabled) on the LCD.

  *Command Syntax:*

  ```
  ipmitool -I lanplus -H <ipaddress> -U <user> -P
  <password> -k <kgkey> delloem lcd status
  ```

**Options for powermonitor**

- `status`: Displays the current power status of the system. The returned values denote energy consumption, peak power (in Watts), and peak amperage (in Amperes).

- `clear peakpower`: Resets the peak power value.

- `clear cumulativepower`: Resets the cumulative power values.

- `powersupplyrating`: Gets the power rating for all the power supplies attached in rated Watts.

  *Command Syntax:*

  ```
  ipmitool -I lanplus -H <ip-address> -U <user> -P
  <password> -k <kgkey> delloem powermonitor
  powersupplyrating
  ```

- `powerconsumption`: Displays the warning threshold, failure threshold, system instantaneous headroom, and system peak headroom in Watts or BTU/hr and the instantaneous current consumption in Amperes.

  *Command Syntax:*

```
ipmitool -I lanplus -H <ip-address> -U <user> -P
<password> -k <kgkey> delloem powermonitor
powerconsumption <watt|btuphr>
```

The system peak headroom is applicable on systems with PMBus support. The peak headroom is reported in BTU/hr or Watt. Peak Headroom (in Watts) = Input Wattage to Power Supply–Peak Power drawn by the system. For redundant power supplies, the minimum input wattage between the two power supplies is taken. This value is not displayed in modular systems. The system instantaneous headroom is applicable on systems with PMBus support. The instantaneous headroom is reported in BTU/hr or Watt. Instantaneous Headroom (in Watts) = Input Wattage to the Power Supply–Instantaneous Power drawn by the system. For redundant power supplies, the minimum input wattage between the two power supplies is taken. This value is not displayed in modular systems.

- `getpowerbudget`: Displays the maximum power, minimum power, and the power budget cap either in BTU/hr or Watt and is supported on *xx*1*x* systems supporting PMBus.

  *Command Syntax:*

  ```
  ipmitool -I lanplus -H <ipaddress> -U <user> -P
  <password> -k <kgkey> delloem powermonitor
  getpowerbudget <watt|btuphr>
  ```

- `setpowerbudget`: Allows you to set the power budget cap either in BTU/hr, or Watt, or in percentage and is supported on *xx*1*x* systems supporting PMBus.

  *Command Syntax:*

  ```
  ipmitool -I lanplus -H <ipaddress> -U <user> -P
  <password> -k <kgkey> delloem powermonitor
  setpowerbudget <val><watt|btuphr|percent>
  ```

✍ **NOTE:** `<val>` should be a positive integer.

- `enablepowercap`: Enables set power cap.

- `disablepowercap`: Disables set power cap.

- `powerconsumptionhistory`: Allows you to get the average and peak power consumption history in Watts or BTU/hr for the last minute, last hour, last day, and the last week.

*Command Syntax:*

```
ipmitool -I lanplus -H <ipaddress> -U <user> -P
<password> -k <kgkey> delloem powermonitor
powerconsumptionhistory <watt|btuphr>
```

**NOTE:** The new power monitoring features are not supported on IPMIsh and SOLProxy.

### Default Subcommand

If you do not specify a subcommand, this command displays the current power status of the system. The returned values denote energy consumption, peak power (in Watts), and peak amperage (in Amperes).

### Options for sysinfo

This command returns both FRU and BMC related information for your system.

### Options for sel

- `list`: Displays all contents of the event log.
  - `first <count>`: Displays the first <count> (oldest) entries in the SEL. If the count is zero, all entries are displayed.
  - `last <count>`: Displays the last <count> (most recent) entries in the SEL. If the count is zero, all entries are displayed.

### Default Subcommand

If you do not specify a subcommand, this command is equivalent to the **sel list** command.

### Options for sensor

- `list`: Displays the complete list of sensors and thresholds in a wide table format.
- `get <id>`: Displays information for sensors specified by the sensor ID number.

### Default Subcommand

If you do not specify a subcommand, this command is equivalent to the **sensor list** command.

### Options for mac

- `list`: Displays the number, MAC address, and status of all NICs. It also displays the DRAC/iDRAC MAC address.
- `get <NIC number>`: Displays the MAC address and status of the specified NIC number.

### Default Subcommand

If you do not specify a subcommand, this command is equivalent to the **mac list** command.

### Options for lan

- `set <Mode>`: Allows you to set NIC selection mode. The selection modes are **Shared** and **Failover**. If you are using iDRAC6 Enterprise, the additional mode available is **Dedicated**.
- `get`: Displays the current NIC selection mode.
- `get active`: Displays the active NIC selection mode.

### Options for windbg

- `start`: Starts the debugging session.
- `end`: Quits the debugging session.

## IPMItool Command for Dynamic Entry on the DNS Server When DRAC is Not Present

To create a dynamic entry on the DNS server when DRAC is not present, use the following command:

```
ipmitool raw 0x18 0x58 0xe4 0x15
```

**NOTE:** You must enter a 21-byte hexadecimal number (a 8-byte input for the PowerEdge 1435SC) for the DHCP name. If the DHCP name is less than 21 bytes (8 bytes for PowerEdge SC1435), pad the end with zeroes.

For example, to set the DNS server name to "foo":

```
ipmitool raw 0x18 0x58 0xe4 0x15 0x66 0x6f 0x6f 0x00
0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0x00 0x00 0x00 0x00 0x00 0x00
```

The ASCII character conversion chart is displayed in Table 3-3:

**Table 3-3.   ASCII Character Conversion Chart**

| Decimal | Octal | Hex | Binary | Value |
|---------|-------|-----|----------|-------|
| 000 | 000 | 000 | 00000000 | NUL (Null character) |
| 001 | 001 | 001 | 00000001 | SOH (Start of Header) |
| 002 | 002 | 002 | 00000010 | STX (Start of Text) |
| 003 | 003 | 003 | 00000011 | ETX (End of Text) |
| 004 | 004 | 004 | 00000100 | EOT (End of Transmission) |
| 005 | 005 | 005 | 00000101 | ENQ (Enquiry) |
| 006 | 006 | 006 | 00000110 | ACK (Acknowledgment) |
| 007 | 007 | 007 | 00000111 | BEL (Bell) |
| 008 | 010 | 008 | 00001000 | BS (Backspace) |
| 009 | 011 | 009 | 00001001 | HT (Horizontal Tab) |
| 010 | 012 | 00A | 00001010 | LF (Line Feed) |
| 011 | 013 | 00B | 00001011 | VT (Vertical Tab) |
| 012 | 014 | 00C | 00001100 | FF (Form Feed) |
| 013 | 015 | 00D | 00001101 | CR (Carriage Return) |
| 014 | 016 | 00E | 00001110 | SO (Shift Out) |
| 015 | 017 | 00F | 00001111 | SI (Shift In) |
| 016 | 020 | 010 | 00010000 | DLE (Data Link Escape) |
| 017 | 021 | 011 | 00010001 | DC1 (XON) (Device Control 1) |
| 018 | 022 | 012 | 00010010 | DC2 (Device Control 2) |
| 019 | 023 | 013 | 00010011 | DC3 (XOFF) (Device Control 3) |
| 020 | 024 | 014 | 00010100 | DC4 (Device Control 4) |
| 021 | 025 | 015 | 00010101 | NAK (Negative Acknowledgement) |
| 022 | 026 | 016 | 00010110 | SYN (Synchronous Idle) |

**Table 3-3. ASCII Character Conversion Chart (continued)**

| Decimal | Octal | Hex | Binary | Value |
|---------|-------|-----|--------|-------|
| 023 | 027 | 017 | 00010111 | ETB (End of Transmission Block) |
| 024 | 030 | 018 | 00011000 | CAN (Cancel) |
| 025 | 031 | 019 | 00011001 | EM (End of Medium) |
| 026 | 032 | 01A | 00011010 | SUB (Substitute) |
| 027 | 033 | 01B | 00011011 | ESC (Escape) |
| 028 | 034 | 01C | 00011100 | FS (File Separator) |
| 029 | 035 | 01D | 00011101 | GS (Group Separator) |
| 030 | 036 | 01E | 00011110 | RS (Request to Send) (Record Separator) |
| 031 | 037 | 01F | 00011111 | US (Unit Separator) |
| 032 | 040 | 020 | 00100000 | SP (Space) |
| 033 | 041 | 021 | 00100001 | ! (Exclamation Mark) |
| 034 | 042 | 022 | 00100010 | " (Double Quote) |
| 035 | 043 | 023 | 00100011 | # (Number Sign) |
| 036 | 044 | 024 | 00100100 | $ (Dollar Sign) |
| 037 | 045 | 025 | 00100101 | % (Percent) |
| 038 | 046 | 026 | 00100110 | & (Ampersand) |
| 039 | 047 | 027 | 00100111 | ' (Single Quote) |
| 040 | 050 | 028 | 00101000 | ((Left/Opening Parenthesis) |
| 041 | 051 | 029 | 00101001 | ) (Right/Closing Parenthesis) |
| 042 | 052 | 02A | 00101010 | * (Asterisk) |
| 043 | 053 | 02B | 00101011 | + (Plus) |
| 044 | 054 | 02C | 00101100 | , (Comma) |
| 045 | 055 | 02D | 00101101 | - (Minus or Dash) |
| 046 | 056 | 02E | 00101110 | . (Dot) |
| 047 | 057 | 02F | 00101111 | / (Forward Slash) |
| 048 | 060 | 030 | 00110000 | 0 |
| 049 | 061 | 031 | 00110001 | 1 |

**Table 3-3.    ASCII Character Conversion Chart** *(continued)*

| Decimal | Octal | Hex | Binary | Value |
|---------|-------|-----|----------|-------------------|
| 050 | 062 | 032 | 00110010 | 2 |
| 051 | 063 | 033 | 00110011 | 3 |
| 052 | 064 | 034 | 00110100 | 4 |
| 053 | 065 | 035 | 00110101 | 5 |
| 054 | 066 | 036 | 00110110 | 6 |
| 055 | 067 | 037 | 00110111 | 7 |
| 056 | 070 | 038 | 00111000 | 8 |
| 057 | 071 | 039 | 00111001 | 9 |
| 058 | 072 | 03A | 00111010 | : (Colon) |
| 059 | 073 | 03B | 00111011 | ; (Semicolon) |
| 060 | 074 | 03C | 00111100 | < (Less Than) |
| 061 | 075 | 03D | 00111101 | = (Equal Sign) |
| 062 | 076 | 03E | 00111110 | > (Greater Than) |
| 063 | 077 | 03F | 00111111 | ? (Question Mark) |
| 064 | 100 | 040 | 01000000 | @ (AT Symbol) |
| 065 | 101 | 041 | 01000001 | A |
| 066 | 102 | 042 | 01000010 | B |
| 067 | 103 | 043 | 01000011 | C |
| 068 | 104 | 044 | 01000100 | D |
| 069 | 105 | 045 | 01000101 | E |
| 070 | 106 | 046 | 01000110 | F |
| 071 | 107 | 047 | 01000111 | G |
| 072 | 110 | 048 | 01001000 | H |
| 073 | 111 | 049 | 01001001 | I |
| 074 | 112 | 04A | 01001010 | J |
| 075 | 113 | 04B | 01001011 | K |
| 076 | 114 | 04C | 01001100 | L |

**Table 3-3.  ASCII Character Conversion Chart** *(continued)*

| Decimal | Octal | Hex | Binary | Value |
|---------|-------|-----|--------|-------|
| 077 | 115 | 04D | 01001101 | M |
| 078 | 116 | 04E | 01001110 | N |
| 079 | 117 | 04F | 01001111 | O |
| 080 | 120 | 050 | 01010000 | P |
| 081 | 121 | 051 | 01010001 | Q |
| 082 | 122 | 052 | 01010010 | R |
| 083 | 123 | 053 | 01010011 | S |
| 084 | 124 | 054 | 01010100 | T |
| 085 | 125 | 055 | 01010101 | U |
| 086 | 126 | 056 | 01010110 | V |
| 087 | 127 | 057 | 01010111 | W |
| 088 | 130 | 058 | 01011000 | X |
| 089 | 131 | 059 | 01011001 | Y |
| 090 | 132 | 05A | 01011010 | Z |
| 091 | 133 | 05B | 01011011 | [(Left/Opening Bracket) |
| 092 | 134 | 05C | 01011100 | \ (Back Slash) |
| 093 | 135 | 05D | 01011101 | ] (Right/Closing Bracket) |
| 094 | 136 | 05E | 01011110 | ^ (Caret/Circumflex) |
| 095 | 137 | 05F | 01011111 | _ (Underscore) |
| 096 | 140 | 060 | 01100000 | ` |
| 097 | 141 | 061 | 01100001 | a |
| 098 | 142 | 062 | 01100010 | b |
| 099 | 143 | 063 | 01100011 | c |
| 100 | 144 | 064 | 01100100 | d |
| 101 | 145 | 065 | 01100101 | e |
| 102 | 146 | 066 | 01100110 | f |
| 103 | 147 | 067 | 01100111 | g |

**Table 3-3.   ASCII Character Conversion Chart** *(continued)*

| Decimal | Octal | Hex | Binary | Value |
|---------|-------|-----|--------|-------|
| 104 | 150 | 068 | 01101000 | h |
| 105 | 151 | 069 | 01101001 | i |
| 106 | 152 | 06A | 01101010 | j |
| 107 | 153 | 06B | 01101011 | k |
| 108 | 154 | 06C | 01101100 | l |
| 109 | 155 | 06D | 01101101 | m |
| 110 | 156 | 06E | 01101110 | n |
| 111 | 157 | 06F | 01101111 | o |
| 112 | 160 | 070 | 01110000 | p |
| 113 | 161 | 071 | 01110001 | q |
| 114 | 162 | 072 | 01110010 | r |
| 115 | 163 | 073 | 01110011 | s |
| 116 | 164 | 074 | 01110100 | t |
| 117 | 165 | 075 | 01110101 | u |
| 118 | 166 | 076 | 01110110 | v |
| 119 | 167 | 077 | 01110111 | w |
| 120 | 170 | 078 | 01111000 | x |
| 121 | 171 | 079 | 01111001 | y |
| 122 | 172 | 07A | 01111010 | z |
| 123 | 173 | 07B | 01111011 | {(Left/Opening Brace) |
| 124 | 174 | 07C | 01111100 | | (Vertical Bar) |
| 125 | 175 | 07D | 01111101 | } (Right/Closing Brace) |
| 126 | 176 | 07E | 01111110 | ~ (Tilde) |
| 127 | 177 | 07F | 01111111 | DEL (Delete) |

# 4

# 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. 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.

- Microsoft SAC does not implement hardware control flow. Therefore, when console redirection is enabled with EMS SAC, you will see corrupted data. As SAC does not implement hardware flow control, you are unable to effectively use SOL Proxy to activate console redirection to EMS SAC. This can result in corrupted screen output caused by missed characters. Slower baud rates correct this situation and still provide good user experience.

### IPMI Shell Issues

- If you type `ipmish` from any directory other than the directory where the BMU is installed, you will receive a "command not found" error from MS-DOS. This is because the BMU install directory is not included in the system search path. You can execute IPMISH directly by specifying a fully-qualified path or by first navigating to the BMC directory and then executing the command. You may also manually add the BMU install directory to the execution search path.

# 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 my SOL Proxy server handle multiple connections at a time?

A: Yes, each SOL Proxy server can handle a maximum of 20 SOL Proxy connections simultaneously. However, by default only one session is permitted. Edit `solproxy.cfg`, remove the comment tag and increase the value of `max_session`.

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" on page 93 for more information about configuring the session timeout parameters.

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 full configuration of VT100 or ANSI emulation mode.

Q. What is the Spanning Tree feature?

A. Most quality routers use the Rapid Spanning Tree Protocol (RSTP) to optimize performance and remove loops. This can cause delays up to 30 seconds or more whenever a NIC is reset. Resets are known to happen during BIOS POST, driver initialization, and some network software installation and configuration. The delay can cause errors when running IPMISH commands. It can also cause a SOL proxy session to become inactivated. You can configure your router to reduce or eliminate the delay by enabling the router option edge-port (Dell PowerConnect) or port fast (Cisco). This will allow the link to remain constant and handle the optimization in real time.

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 as much as 30 to 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. When the spanning tree feature is enabled on a edge-port or port fast router, the network link can be broken for periods of time in excess of 30 seconds while the router analyzes the network. This situation can be identified partially when the link light is off. IPMISH commands can timeout during this process. Disable spanning-tree on the port fast router or enable the **Spanning Tree Fast** option 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 I see a connection time-out error message when I perform the **Power Reset** command using the IPMISH command line tool?

A: The spanning-tree feature described in the previous Q&A can cause problems during power management as well. Use the solution above to help assure that power reset and other power management commands can function without network timeouts.

Q: Why do some key and key combinations, such as <F10> and <Ctrl><Alt><Del>, 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 "Escape Key Sequences" on page 129 for more information on the same.

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" on page 117 for more information about using Terminal Mode commands.

**5**

# BMC Management Utility Error Codes

The following is 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 5-1.

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 5-1.   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 |

**Table 5-1.   BMC Management Utility Error Codes** *(continued)*

| Code | Classification | Message | Description | IPMI Error |
|---|---|---|---|---|
| A5h | Initialization errors. | Authentication failure. | Request for a session from the local or remote proxy was rejected. | |
| | | 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. | |

**Table 5-1.   BMC Management Utility Error Codes** *(continued)*

| Code | Classification | Message | Description | IPMI Error |
|------|----------------|---------|-------------|------------|
| | | 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 |
| | | Firmware error. | Command response could not be provided. | 0xCE |
| | | Destination error. | Cannot deliver request to destination. | 0xD3 |
| | | Device error. | Device specific (OEM) errors. | 0x01–0x 7E |
| 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 |

**Table 5-1. BMC Management Utility Error Codes** *(continued)*

| Code | Classification | Message | Description | IPMI Error |
|------|----------------|---------|-------------|------------|
| | | 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. | |

# 6

# 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 Intelligent Platform Management Interface (IPMI) hex-ASCII commands

## Configuring Terminal Mode

**NOTE:** Terminal Mode can be configured through Server Administrator and the Deployment Toolkit (DTK).

To configure Terminal Mode through Server Administrator, complete the following steps:

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 **Remote Access** object.

5 The **BMC Information** window is displayed.

6 Click the **Configuration** tab.

In the **Configuration** tab, click **Serial Port**.

7 Click the **Terminal Mode Settings** button.

You can configure the Connection Mode Setting, Baud Rate, Flow Control, and Channel Privilege Level Limit attributes on this screen.

- The Serial communication connection mode for the BMC must be set to **Direct Connect terminal Mode** for Dell PowerEdge *x8xx*, *x9xx*, *xx0x*, and *xx1x* systems.

- **External Serial Connector** must be configured and set to **Remote Access** for PowerEdge *x9xx*, *xx0x*, and *xx1x* systems. This option is available under the **Serial Communication** submenu in the BIOS Setup.

- Disable the **RAC serial Console** if you have a DRAC 5 installed. Login to the DRAC GUI, navigate to **Serial** from **Remote Access**, and disable **Enable Serial console**.

- Set **Serial Port** 1 for PowerEdge *x8xx* systems. This option is available in the **BIOS Setup**, in the **Integrated Devices** menu.

### Using Terminal Mode

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 IPMI 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" on page 25 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 displaying an output newline sequence. Otherwise, the BMC looks for the next start character.

### Special Character Handling — <Delete> or <Backspace> character

The <Backspace> or <Delete> 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 "\" 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 6-1 lists the terminal mode requests to BMC and Table 6-2 lists the terminal mode responses from BMC. The following is an example of a binary IPMI request message:

`[18 00 22]<newline sequence>`

**Table 6-1.   Terminal Mode Request to BMC**

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

**Table 6-2.   Terminal Mode Response from BMC**

| Byte | Explanation |
| --- | --- |
| 1 | [7:2] – Net Function (odd)<br>[1:0] – Responder's LUN |
| 2 | [7:2] – Requester's Sequence Number<br>[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 6-3 lists the terminal mode text commands and Table 6-4 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 6-3.    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. |

**Table 6-3.   Terminal Mode Text Commands** *(continued)*

| Command | Switches | Description |
|---|---|---|
| SYS TMODE | | Used as a no-op confirm that Terminal Mode is active. The BMC returns an OK response followed by TMODE. |
| SYS SET BOOT XX YY ZZ AA BB | | 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. |
| | | 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. |
| SYS SET BOOTOPT XX YY…NN | | 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. XX YY…NN represent the hex-ASCII encoding for the data bytes that are passed in the Set System Boot Options request. |
| | | XX — Parameter valid. |
| | | [7] — 1b = Mark parameter invalid/locked. |
| | | 0b = Mark parameter valid/unlocked. |
| | | [6:0] — Boot option parameter selector . |
| | | YY…NN — Boot Option Parameter Data. |
| | | Passing 0-bytes of parameter data allows the parameter valid bit to be changed without affecting the present parameter setting. |

**Table 6-3. Terminal Mode Text Commands** *(continued)*

| Command | Switches | Description |
| --- | --- | --- |
| SYS GET BOOTOPT XX YY ZZ | | This is a text version of the IPMI Get System Boot Options command. It allows any of the boot option parameters to be retrieved. |
| | | XX YY ZZ represents the hex-ASCII for the data bytes that are passed in the Get System Boot Options request. |
| | | The BMC returns the data from the command in hex-ASCII format. |
| | | XX—Parameter selector. |
| | |     [7]—Reserved. |
| | |     [6:0]—Boot option parameter selector. |
| | | YY—Set Selector. |
| | |     [7:0]—Selects a particular block or set of parameters under the given parameter selector. |
| | |     Write as 00h if the parameter does not use a Set Selector. |
| | | ZZ—Block Selector. |
| | |     Selects a particular block within a set of parameters |
| | | Write as 00h if the parameter does not use a Block Selector. |
| | | **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. |

**Table 6-3.    Terminal Mode Text Commands** *(continued)*

| Command | Switches | Description |
|---|---|---|
| SYS SET TCFG | | 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 6-4, and AA BB represent hex-ASCII encoding of the non-volatile version. |
| | | V:XX <output termination sequence> |
| | | N:AA BB <output termination sequence> |
| | -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 6-4. 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 6-4. The BMC returns the same output as for SYS SET TCFG, above. |
| SYS RESET | | Directs the BMC to perform an immediate system hard reset. |
| 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. |

**Table 6-3. Terminal Mode Text Commands *(continued)***

| Command | Switches | Description |
| --- | --- | --- |
| SYS HEALTH QUERY | | 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. |
| | | `PWR:zzz H:xx T:xx V:xx PS:xx C:xx D:xx S:xx O:xx` |
| | | Where: |
| | | `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). |
| | | zzz is: **ON**, **OFF** (soft-off or mechanical off), **SLP** (sleep - used when sleep level cannot be distinguished), **S4, S3, S2, S1, ??** (unknown). |
| | | and xx is: ok, nc, cr, nr, uf, or ?? where: |
| | | **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 6-3.  Terminal Mode Text Commands *(continued)***

| Command | Switches | Description |
|---------|----------|-------------|
| SYS HEALTH QUERY | -V | 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: |
| | | 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*>. |
| | | Where xx is: |
| | | **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). |
| SYS IDENTIFY | | Causes the BMC to indicate the system's location in a rack of systems, for example, with a blinking LED or beep. The BMC will indicate the system's location only for 15 seconds. This is a text version of the optional **Chassis Identify** command. |

**Table 6-3.    Terminal Mode Text Commands _(continued)_**

| Command | Switches | Description |
|---------|----------|-------------|
| SYS IDENTIFY | -ON<XX> | Causes the BMC to indicate the system's location, for example, with a blinking LED or beep for a specific period of time. |
|  |  | XX is an optional hex-ASCII byte representing the number of seconds the BMC is to cause the system to identify itself. If XX is not provided, the BMC will indicate the system's location only for 15 seconds. This is a text version of the optional **Chassis Identify** command. |
| SYS IDENTIFY | -OFF | Causes the BMC to stop indicating the system's location. This has no effect if the system is not currently identifying itself. This is a text version of the optional **Chassis Identify** command. |

**Table 6-4.    Terminal Mode Configuration**

| Byte | Explanation |
|------|-------------|
| 1 | [7:6]—Reserved. |
|  | [5]—Line Editing. |
|  | 0b = Disable. |
|  | 1b = Enable (Factory default). |
|  | [4]—Reserved. |
|  | [3:2]—Delete control (only applies when line editing is enabled). |
|  | 00b = BMC outputs a <Delete> character when <Backspace> or <Delete> is received. |
|  | 01b = BMC outputs a <Backspace>< SP ><Backspace> sequence when <Backspace> or <Delete> is received (Factory default). |
|  | [1]—Echo control0b = No echo 1b = Echo (BMC echoes characters it receives)   (Factory default). |
|  | [0]—Handshaking—BMC outputs a [SYS]<_newline_> after receiving each terminal mode IPMI message and is ready to accept the next message. |
|  | 0b = Disable. |
|  | 1b = Enable (Factory default). |

**Table 6-4. Terminal Mode Configuration** *(continued)*

| Byte | Explanation |
|------|-------------|
| 2 | [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. |
| | 0h = no termination sequence. |
| | 1h = <CR-LF> (Factory default) |
| | 2h = <NULL> |
| | 3h = <CR> |
| | 4h = <LF-CR> |
| | 5h = <LF> |
| | All other = reserved |
| | [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. |
| | 0h = reserved |
| | 1h = <CR> (Factory default) |
| | 2h = <NULL> |
| | All other = reserved |

# 7

# Escape Key Sequences

Console redirection uses ANSI or VT100/220 terminal emulation, which are limited to basic ASCII characters. There are no function keys, arrow keys, or control keys in this character set. However, most BIOS software requires the use of function keys and control keys for ordinary actions. Specific function keys and escape keys can be emulated by using a special key sequence, called an escape sequence, to represent a specific key.

Use the Escape sequences, listed in the following table, for keys while setting console redirection in BIOS through serial port. These keys are also listed during BIOS POST. Press the spacebar to pause and view the list. Supported sequences are also listed in the history of the system's telnet client.

**Table 7-1.   Escape sequences for specific keys**

| Key | Supported sequences |
| --- | --- |
| F10 | \<Esc>\<0> |
| F12 | \<Esc>\<@> |
| \<Ctrl>\<M> | \<Esc>\<Ctrl>\<M> |
| \<Ctrl>\<H> | \<Esc>\<Ctrl>\<H> |
| \<Ctrl>\<I> | \<Esc>\<Ctrl>\<I> |
| \<Ctrl>\<J> | \<Esc>\<Ctrl>\<J> |
| \<Alt>\<X> | \<Esc>\<X>\<X> |
| \<Ctrl>\<Alt>\<Del> | \<Esc>\<R>\<Esc>\<r>\<Esc>\<R> |

# 8

# Serial Port Console Redirection

## Serial Communication

For Dell PowerEdge *x9xx*, *xx0x*, and *xx1x* systems, serial console redirection can be accomplished using COM1 or COM2.

### Console Redirection Via COM1

To activate serial console redirection via COM1, you must configure the following settings:

- Set **Serial Communication**→ **Serial Communication** to **On with Console Redirection via COM1**
- Set **Serial Communication**→ **External Serial Connector** to **COM1**

### Console Redirection Via COM2

Console Redirection via COM2 can be used to redirect either to the external connector or to the remote access device, such as a BMC or DRAC 5/iDRAC6 Enterprise, for Serial Over LAN (SOL) communication.

To activate serial console redirection via COM2, you must configure the following settings:

- Set **Serial Communication**→ **Serial Communication** to **On with Console Redirection via COM2**
- Set **Serial Communication**→ **External Serial Connector** to **COM2**

> **NOTE:** If the console redirection is used for SOL then the *External Serial Connector* setting does not need to be configured.

When using COM2 for console redirection regardless of whether you redirect to the external connector or for SOL, the BIOS reads the SOL baud rate from the BMC and uses that setting to activate console redirection. SOL baud rate can be configured using the Dell Deployment Toolkit, OMSA, DRAC, or the BMU.

## Serial Terminal Communication to BMC or DRAC

Serial Terminal Mode allows you to directly connect to the BMC or DRAC using a serial port connection and execute text-based commands. See "Terminal Mode Commands" on page 117 for information about configuring your BMC and DRAC for Serial Terminal Communication as well as available Terminal Mode Commands.

In Terminal Mode, the BMC or the DRAC, if present, support Escape key sequences that allow switching between the Serial Terminal Connection and the connection to the system COM2 port. This can be combined with the Console Redirection via COM2 (see "Console Redirection Via COM2" on page 131) to switch between viewing the system console redirection and communicating to BMC or DRAC to execute the terminal commands such as system reset.

*NOTE:* For this combined functionality, Serial Communication baud rate and the SOL baud rate must be set to the same value.

When in terminal mode, to switch the connection to the system COM2 port use:

**<Esc> +<Shift> <q>**

When connected to the system COM2 port, to go back to the terminal mode use:

**<Esc> +<Shift> <9>**

# SPCR Table

The Serial Port Console Redirection (SPCR) table provides information about how the system firmware and service processor use the out-of-band (OOB) management port. For example, if the OOB Management port is a serial port, the SPCR table contains information such as serial port number, baud terminal type, and other settings used for OOB communication. The SPCR table is read by the Special Administrative Console (SAC) for console redirection and configures itself automatically during a bootable CD installation.

The SPCR table is automatically enabled if the system service processor supports Emergency Management Services (EMS) such as console redirection. If it is not configured automatically, you must configure SPCR to match BMC settings by adding the following parameters to the **unattend.txt** file.

**NOTE:** The **unattend.txt** file is automatically created after installation.

```
[Data]

EMSPort

EMSBaudrate
```

Where,

EMSPort = Port used for serial communication. For example, COM1 or COM2.

EMSBaudrate = Configured baud rate for communication. The minimum supported baud rate for supported Dell PowerEdge systems is 19200.

# Serial Console redirection With SOL Proxy

### Configuring Linux for Serial Redirection During Boot

The "SysRq key" is a key sequence that allows basic commands to be passed directly to the kernel for debugging. Under some circumstances, it can also be used to reboot remote managed systems. The serial console uses the RS-232 break function as the SysRq key. A "break" is a period of no transmission on the serial line. To configure the "Sysrq" key in systems running Linux, follow the instructions given below:

**NOTE:** The following instructions are specific to the Linux GRand Unified Bootloader (GRUB). Similar changes would be necessary for using a different boot loader.

**CAUTION: In configuring the client VT100/VT220 emulation window, you must set the window or application that is displaying the redirected console to 25 rows x 80 columns to ensure proper text display. Also, disable scrolling in the window option. Otherwise, some text screens may be garbled.**

Edit the file **/etc/grub.conf**, as follows. See the sample file that follows, which shows the changes described in this procedure.

1 Add the following two new lines in the *general settings* section of the file:

   ```
   serial --unit=0 --speed=19200
   terminal --timeout=10 serial
   ```

2 Append two options to the kernel line:

   ```
   kernel ............ console=ttyS0,19200
   ```

**3** If the **/etc/grub.conf** contains a `splashimage` directive, you must comment it out.

This sample file, using a baud rate of 19200, is an example. The following maximum baud rates are allowed for BMC serial communication and SOL:

- 19200 for PowerEdge 1425SC and other PowerEdge *x8xx* systems.
- 57600 for PowerEdge *x9xx* and *xx0x* systems without Dell Remote Access Controller 5 (DRAC 5).
- 115200 for PowerEdge *x9xx*, and *xx0x* systems with DRAC 5.
- 115200 for PowerEdge *xx1x* systems.

**Table 8-1.   Sample File: /etc/grub.con**

```
# grub.conf generated by anaconda
#
Note that you do not have to rerun grub after making
changes to this file
# NOTICE:  You do not have a /boot partition.  This means
that
#          all kernel and initrd paths are relative to /,
e.g.
#          root (hd0,0)
#          kernel /boot/vmlinuz-version ro root=/dev/sdal
#          initrd /boot/initrd-version.img
#boot=/dev/sda
default=0
timeout=10
#splashimage=(hd0,2)/grub/splash.xpm.gz

serial --unit=0 --speed=19200
terminal --timeout=10 serial

title Red Hat Linux Advanced Server (2.4.9-e.3smp)
   root (hd0,0)
   kernel /boot/vmlinuz-2.4.9-e.3smp ro root=/dev/sda1
hda=ide-scsi console=tty0 console=ttyS0,19200
   initrd /boot/initrd-2.4.9-e.3smp.img
title Red Hat Linux Advanced Server-up (2.4.9-e.3
   root (hd0,00)
   kernel /boot/vmlinuz-2.4.9-e.3 ro root=/dev/sda1 s
   initrd /boot/initrd-2.4.9-e.3.im
```

Additional information for editing the **grub.conf**:

1   You may need to disable GRUB's graphical interface and use the text-based interface instead; otherwise, the GRUB screen will not be displayed in BMU console redirection. To do so, comment out the line starting with `splashimage`.

2   If you have multiple options in GRUB and you want all of them to start a console session through the BMU serial connection, add `console= ttyS1,19200` to all options. The preceding example shows `console= ttyS0,19200` added to only the first option.

### Enabling Login to the Console After Boot

Edit the file **/etc/inittab**, as follows:

Add a new line to configure a getty on the COM1 serial port:

```
co:2345:respawn:/sbin/agetty -h -L 19200 ttyS0
vt100
```

See the sample file, which shows the addition of the new line.

**Table 8-2. Sample File: /etc/innitab**

```
#
# inittab     This file describes how the INIT process
should set up
#             the system in a certain run-level.
#
# Author:     Miquel van Smoorenburg,
<miquels@drinkel.nl.mugnet.org
#             Modified for RHS Linux by Marc Ewing and
Donnie Barnes
#

# Default runlevel. The runlevels used by RHS are:
#   0 - halt (Do NOT set initdefault to this)
#   1 - Single user mode
#   2 - Multiuser, without NFS (The same as 3, if you do
not have
#       networking)
#   3 - Full multiuser mode
#   4 - unused
#   5 - X11
#   6 - reboot (Do NOT set initdefault to this)
#
id:3:initdefault:

# System initialization.
si::sysinit:/etc/rc.d/rc.sysinit


l0:0:wait:/etc/rc.d/rc 0
l1:1:wait:/etc/rc.d/rc 1
l2:2:wait:/etc/rc.d/rc 2
l3:3:wait:/etc/rc.d/rc 3
l4:4:wait:/etc/rc.d/rc 4
l5:5:wait:/etc/rc.d/rc 5
l6:6:wait:/etc/rc.d/rc 6
```

**Table 8-2.   Sample File: /etc/innitab** *(continued)*

```
# Things to run in every runlevel.
ud::once:/sbin/update

# Trap CTRL-ALT-DELETE
ca::ctrlaltdel:/sbin/shutdown -t3 -r now

# When our UPS tells us power has failed, assume we have
a few
# minutes of power left. Schedule a shutdown for 2
minutes from now.
# This does, of course, assume you have power installed
and your
# UPS is connected and working correctly.
pf::powerfail:/sbin/shutdown -f -h +2 "Power Failure;
System Shutting Down"
# If power was restored before the shutdown kicked in,
cancel it.
pr:12345:powerokwait:/sbin/shutdown -c "Power Restored;
Shutdown Cancelled"


# Run gettys in standard runlevels
co:2345:respawn:/sbin/agetty -h -L 19200 ttyS0 vt100
1:2345:respawn:/sbin/mingetty tty1
2:2345:respawn:/sbin/mingetty tty2
3:2345:respawn:/sbin/mingetty tty3
4:2345:respawn:/sbin/mingetty tty4
5:2345:respawn:/sbin/mingetty tty5
6:2345:respawn:/sbin/mingetty tty6

# Run xdm in runlevel 5
# xdm is now a separate service
x:5:respawn:/etc/X11/prefdm -nodaemon
```

Edit the file **/etc/securetty**, as follows:

Add a new line, with the name of the serial tty for COM1:

```
ttyS0
```

See the sample file, which shows the addition of the new line.

**Table 8-3.    Sample File: /etc/securetty**

```
vc/1
vc/2
vc/3
vc/4
vc/5
vc/6
vc/7
vc/8
vc/9
vc/10
vc/11
tty1
tty2
tty3
tty4
tty5
tty6
tty7
tty8
tty9
tty10
tty11
ttyS0
```

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