

Remote Configuration of Serial and Telnet Interfaces to the DRAC 4

The Dell™ Remote Access Controller 4 (DRAC 4) provides a command-line interface designed to enable the configuration and systems management functions that an administrator would normally perform using the DRAC 4 Web-based graphical user interface. This article discusses the tools available to the DRAC 4 through serial and Telnet sessions, which help provide administrators with a quick, convenient way to manage remote systems.

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We live in a visual world. This is evident in the bright billboard images that grab our attention along the highway and the multimillion-dollar special effects that are now standard in every blockbuster movie. Imagery has also become standard for computers, and is typically delivered through graphical user interfaces (GUIs) on notebooks, desktops, and servers. Administrators often become so accustomed to opening a browser, clicking a button, or dragging an icon that they disregard alternate input systems such as the command-line interface (CLI), which can provide powerful access to systems. The Dell Remote Access Controller 4 (DRAC 4) offers exactly such an input system, delivering CLI capability through serial and Telnet sessions.

The following serial and Telnet console features and functionality are supported in the DRAC 4:

- One serial client connection and up to four Telnet client connections at a time
- CLI functions that enable administrators to power up, power down, power cycle, or reset the server; view logs; view sensor status; and configure the remote access controller (RAC)

- RAC serial/telnet console support for the Racadm command-line utility
- Command-line editing and history—for example, previously entered commands can be recalled using up arrow and down arrow keys
- Capability to display and interact with the managed server's text console—such as the BIOS setup, the boot sequence, and the operating system (OS) serial console—using the `connect com1` or `connect com2` commands

Understanding serial and Telnet interfaces

The differences between serial and Telnet interfaces include the physical connection paths to the RAC, the connection speed, the number of clients supported, and the client terminal applications used (see Figures 1 and 2). Internal hardware interfaces on the managed server provide the RAC with access to the server's COM1 (RAC) port, console video, and hardware management functions—and also enable administrators to power up, power down, or reset the managed server and to access logs and sensors.

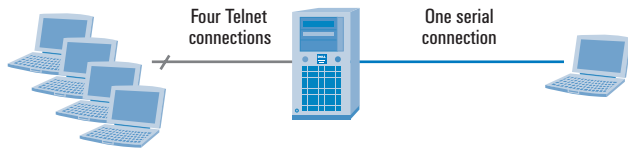


Figure 1. Serial and Telnet connections to the RAC CLI

The serial console is available through an external serial connector on the server chassis. Only one serial connection may be active at any given time. The BIOS setup is used to internally connect the RAC between the server COM1 Universal Asynchronous Receiver Transmitter (UART) device and the external serial connector for COM1. When configured this way, the RAC CLI can be used to access the server through the RAC if desired (using `connect com2`). For security purposes, some companies choose to provide only serial access to the RAC. The connection is generally accomplished with a null modem cable, which must carry the hardware flow control signals. If this flow control is not present, no connection will be apparent to the RAC.

The Telnet console is available through the RAC 10/100 Ethernet network adapter. Up to four Telnet connections may be present at any given time. The RAC CLI can be used to access the server's COM1 serial console if the BIOS has been configured to connect the RAC to the serial port. For security purposes, some organizations may create a private network for Telnet access—or choose to disable the Telnet interface.

To connect to the server's serial or Telnet console, the management station must have terminal emulation software installed. Dell recommends the terminal emulation applications mentioned in the "Configuring BIOS menus" section of this article.

The management station can be connected to the server through the server's serial port using terminal emulation software and a null modem cable, or through a Telnet connection using terminal emulation software and the RAC network adapter. Administrators must consider configurations in four areas when connecting the management station to the server:

- Server OS
- BIOS
- RAC
- Terminal emulation client application

Server OS configuration is beyond the scope of this article, but BIOS, RAC, and terminal emulation client application configurations are discussed in the following sections.

Configuring BIOS menus

The Dell BIOS has two menus that should be configured: a console redirection menu and an integrated devices menu. In the console redirection menu, the redirection setting must be enabled. This

redirects the text output of the server to the internal serial port. Enabling the redirection-after-boot setting also allows DOS to access the serial port. The Linux® OS and the Special Administration Console (SAC) will be able to access the port regardless of the redirection-after-boot setting.

Enabling the serial/telnet console on the RAC

By default, the RAC has both the serial and the Telnet interfaces disabled. To enable these features, the RAC user must modify the RAC-configurable serial group settings using the `racadm` CLI command either locally or remotely. To enable the serial/telnet console from the managed server, the RAC user should enter the following local commands at a command prompt:

```
racadm config -g cfgSerial -o cfgSerialConsoleEnable 1
racadm config -g cfgSerial -o cfgSerialTelnetEnable 1
```

When using the `racadm` command remotely, the RAC root username, RAC root password, and managed server RAC IP address must be included. To enable the serial/telnet console remotely, the RAC user should type the following remote commands at a command prompt:

```
racadm -u username -p password -r RAC IP address
config -g cfgSerial cfgSerialConsoleEnable 1

racadm -u username -p password -r RAC IP address
config -g cfgSerial cfgSerialTelnetEnable 1
```

To enable the serial/telnet console, the RAC user must be assigned the role-based permission level of Administrator or Custom, which includes the Configure RAC Settings privilege. Other serial/telnet configuration attributes can be configured on the RAC, but this article assumes that the RAC defaults are used.

Feature	Telnet	Serial
Maximum number of client systems	Four	One
Physical connection	Ethernet-to-RAC network port	Null modem cable to system serial connector
Speed	10/100 Ethernet	115,200 bits per second (bps) maximum baud rate (selectable) with flow control such as Data Terminal Ready (DTR)
Terminal type	VT-100 or ANSI	VT-100 or ANSI
Access	Any logical network connection	Physical null modem cable connection only
Client terminal applications	Telnet (on a Microsoft Windows command line and Linux <code>xterm</code> program)	HyperTerminal (Windows) minicom (Linux)

Figure 2. Serial and Telnet RAC features

Configuring management station terminal emulation software

The DRAC 4 supports a serial or Telnet RAC text console on a management station running terminal emulation software. Any of the following types of terminal emulation software may be used:

- Red Hat® Linux minicom in an xterm window
- Hilgraeve’s HyperTerminal Private Edition version 6.3
- Red Hat Linux Telnet in an xterm window
- Microsoft® Telnet

Although this article assumes that the default configuration of the RAC is being used, the RAC can be configured to provide different baud rates, ANSI emulation, and so on. VT-100 emulation is recommended because that is the configuration assumed by the BIOS in its setup screens. For best results, administrators should use 25 lines on the terminal screen. Other window lengths may cause some portion of the display to appear scrambled, with lines out of place. Placement of lines is dependent on the method used to output text information by the application, an option ROM, or the OS that is displaying information.

Configuring Red Hat Linux minicom for serial console emulation. Minicom is the Red Hat Linux serial port access utility. The following steps are valid for configuring minicom version 1.8 for serial console emulation. Other minicom versions may differ slightly but require the same basic settings (see Figure 3) for serial console emulation:

1. To start a new xterm session, enter `xterm &` at the command prompt.
2. Drag the lower-right corner of the window with the mouse to resize it to 80 × 25 before using Telnet.
3. If a minicom configuration file exists, enter `minicom minicom configuration file name` and skip to step 17. If a minicom configuration file does not exist, go to step 4.
4. At the xterm command prompt, enter `minicom -s` to bring up the main setup menu.
5. Select “Serial Port Setup” and press Enter.
6. Press A and select the appropriate serial device (for example, `/dev/ttySo`).
7. Press E and set the bps/parity/bits option to 115,200 8N1 (9,600 8N1 for DRAC III only).
8. Press F and set the hardware flow control setting to “Yes” and the software flow control setting to “No.”
9. To exit the Serial Port Setup menu, press Enter.
10. Select “Modem and Dialing” from the main setup menu, and press Enter.
11. In the Modem Dialing and Parameter Setup menu, press Backspace to clear the init, reset, connect, and hangup settings (so that they are blank).

Setting description	Required setting
Bps/parity/bits	115,200 8N1
Hardware flow control	Yes
Software flow control	No
Terminal emulation	VT-100
Modem dialing and parameter settings	Clear the init, reset, connect, and hangup settings
Window size	80 × 25

Figure 3. Minicom settings

12. To save each blank value, press Enter.
13. When all specified fields are clear, press Enter to exit the Modem Dialing and Parameter Setup menu.
14. Select “Save setup as *minicom configuration file name*” and press Enter.
15. Select “Exit from minicom” and press Enter.
16. At the command-shell prompt, enter the following: `minicom minicom configuration file name`.
17. To expand the minicom window to 80 × 25, drag the corner of the window with the mouse.
18. To exit minicom, press `Ctrl+A+Z+X`.

If using minicom for serial text console redirection to configure the managed server BIOS, it may be useful to turn on color in minicom to better display highlighted characters on the screen. To turn on color, enter `minicom -c on` at the command prompt.

Ensure that the minicom window displays a command prompt such as `[RAC\root]#`. When the command prompt appears, the connection is successful and the administrator is ready to connect to the managed server console by using the `connect com1` or `connect com2` serial command.

Configuring HyperTerminal for serial console emulation. HyperTerminal is the Microsoft Windows® serial port access utility. To set the size of the console screen appropriately, use Hilgraeve’s HyperTerminal Private Edition version 6.3.

To configure HyperTerminal for serial console redirection, perform the following steps:

1. Start the HyperTerminal program.
2. Enter a name for the new connection, and click the OK button.
3. To connect, select the COM1 or COM2 port on the management station to which the DB-9 null modem cable is connected, and click the OK button (see Figure 4).
4. Configure the COM1 or COM2 port settings as shown in Figure 5.
5. Click the OK button.
6. Select `File > Properties` and then select the Settings tab.
7. Set the Telnet terminal ID to “VT-100.”

Signal name	DB-9 managed server pin	DB-9 management station pin
Frame Ground (FG)	n/a	n/a
Transmit Data (TD)	3	2
Receive Data (RD)	2	3
Request To Send (RTS)	7	8
Clear To Send (CTS)	8	7
Signal Ground (SG)	5	5
Data Set Ready (DSR)	6	4
Carrier Detect (CD)	1	4
Data Terminal Ready (DTR)	4	1 and 6

Figure 4. Required pinouts for the DB-9 null modem cable

8. Select “Terminal Setup” and then set Screen Rows to “25.”
9. Set Columns to “80” and click the OK button.

The HyperTerminal window displays a command prompt such as [RAC\root]#. When the command prompt appears, the connection is successful and the administrator can connect to the managed system console by using either the `connect com2` or `connect com1` serial command.

Configuring Red Hat Linux xterm for Telnet console emulation. When running Telnet with Red Hat Linux, perform the following steps:

1. To start a new xterm session, enter `xterm &` at the command prompt.
2. Drag the lower-right corner of the window to resize it to 80 × 25 before using Telnet.

Red Hat Linux xterm is now ready to connect through Telnet to the managed server RAC. To connect to the RAC, enter `telnet RAC IP address` at the xterm prompt.

Configuring Microsoft Telnet for Telnet console emulation. Microsoft Telnet does not require any configuration for using a text Telnet console. To connect to the RAC, open a command prompt, enter `telnet RAC IP address`, and press Enter.

Setting description	Required setting
Bits per second	115,200
Data bits	8
Parity	None
Stop bits	1
Flow control	Hardware

Figure 5. Management station COM1 or COM2 port settings

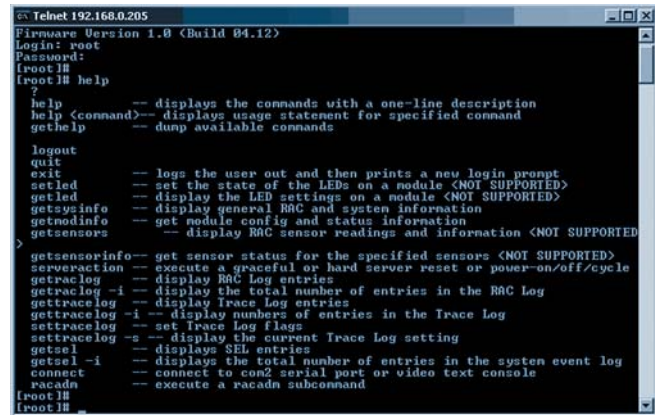


Figure 6. Telnet commands

Logging in to the RAC

After the management station’s terminal emulation software is configured, perform the following steps to log in to the RAC:

1. Connect to the RAC using the management station’s terminal emulation software.
2. Enter the RAC username and press Enter.
3. Enter the RAC password and press Enter.

Connecting to the server using the connect com2 command

To use the `connect com2` command to connect to the server COM1 or COM2 port internally, enter `connect com2` at the RAC serial/telnet console command prompt. Because the console redirection feature is designed only for text consoles, the server must be in text mode for console redirection to work properly. Examples of text mode include the BIOS startup sequence (sometimes called power-on self-test, or POST); the DOS command prompt; and the Microsoft Windows Server™ 2003 SAC prompt. Linux can also be configured to create a text console on the serial port. While the connect command is in effect, the RAC is essentially a wire that connects the internal COM1 or COM2 port of the managed server to the terminal emulator of the management station.

Performing actions on the managed server

The RAC serial or Telnet command shell can be used to power up, power down, or reset the server; view logs; view sensor status; and configure the RAC without the use of a GUI. A wide range of commands are available to the user (see Figure 6).

Although the GUI works well for most tasks, it limits administrators to performing tasks one server at a time. In many organizations, administrators must perform the same task on numerous systems. This process can be time-consuming or, if the GUI is not available, impossible in organizations that have elected to enhance network

security by limiting server access to direct serial connections. In scenarios in which administrators must maintain multiple systems or work without GUI access, a clear understanding of the command-line tools available to the DRAC 4 can help get the job done. [↔](#)

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