

Improved Management

Using the LAN and Serial Interfaces in Ninth-Generation Dell PowerEdge Servers

This article discusses the enhanced server management functionalities of ninth-generation Dell™ PowerEdge™ servers, which can be accessed through LAN and serial interfaces to enable flexibility and uniformity in server management.

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Effective server management is key to maintaining high availability and reliability in enterprise IT environments. The industry standard for server management is the Intelligent Platform Management Interface (IPMI). The term *intelligent platform management* refers to autonomous monitoring and recovery features implemented directly in platform management hardware and firmware. IPMI functionalities are a key component in providing enterprise-class management for high-availability systems.

This article discusses the two interfaces available in ninth-generation Dell PowerEdge servers for out-of-band (OOB) communication: LAN and serial. It also explores the advantages of each interface as well as scenarios in which one interface is preferable to the other.

LAN interface

Ninth-generation Dell PowerEdge servers offer more server management connectivity mechanisms than

previous-generation Dell servers. When using the LAN interface, administrators have three options for connecting to and managing servers: dedicated NIC mode, shared NIC mode, and failover mode.

Dedicated NIC mode

A dedicated network interface is provided via the Dell Remote Access Controller 5 (DRAC 5). This interface allows access using Telnet, a Web-based graphical user interface (GUI), and Secure Shell. Administrators who wish to isolate management traffic from in-band traffic should choose this connectivity path.

Administrators can select the DRAC dedicated network interface card (NIC) option in the baseboard management controller (BMC) BIOS binary option ROM by pressing Ctrl + E during the power-on self-test (POST) and then selecting “Dedicated” in the NIC Selection field (see Figure 1). *Note:* This option is available only if a DRAC 5 is present.

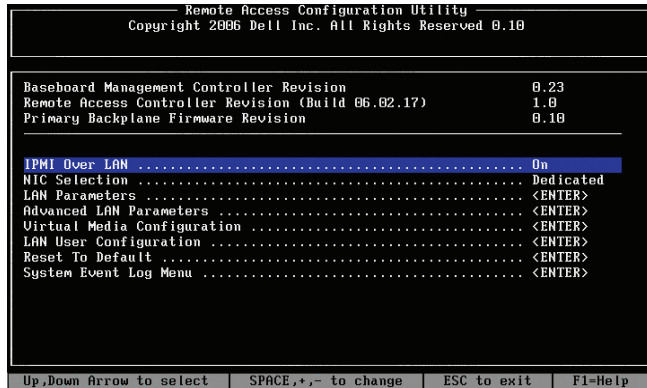


Figure 1. NIC Selection field in the BMC BIOS binary option ROM

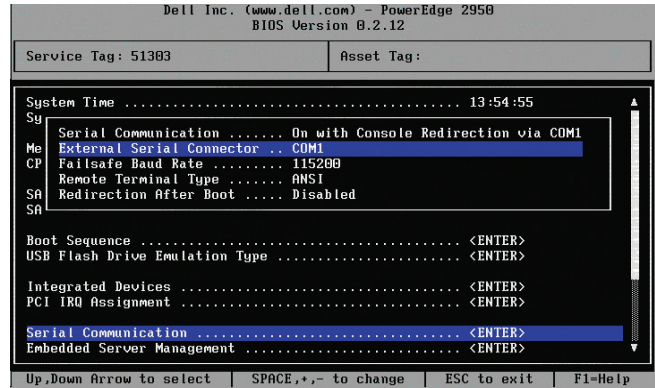


Figure 2. Serial Communication menu options in the BIOS

Shared NIC mode

For base system management, administrators can connect to the BMC through the LAN on Motherboards (LOMs) in shared NIC mode. As an enhancement over previous generations of Dell PowerEdge servers, shared NIC mode enables connection to the BMC through either LOM, not just one.

Shared NIC mode is useful for administrators seeking fewer network router ports and less cabling between the server and network infrastructure compared to dedicated mode.

In shared NIC mode, server management traffic is on the same network as in-band traffic to the host OS. The LOMs isolate management traffic by filtering out IPMI packets to the side-band interface for communication with the BMC. Administrators can select the shared NIC mode in the BMC BIOS binary option ROM by selecting “Shared” in the NIC Selection field (see Figure 1).

While in shared NIC mode with a DRAC 5 installed, network connectivity to the DRAC 5 is available through the LOMs. All functions that are available through the DRAC 5 dedicated NIC are also available in shared NIC mode, including Telnet, the Web GUI, remote console redirection, and virtual media.

Failover mode

Dual-LOM systems support failover for in-band traffic in case a problem arises with one of the LOMs or its network connectivity. In failover mode, the same is true for management traffic that goes through the LOMs to the BMC or DRAC 5.

In this mode, both LOMs are teamed using IEEE 802.3ad teaming and are fault tolerant. Administrators seeking high network uptime and throughput should use this option, because it is designed to increase network uptime by protecting the network in the event of a failure or lost connectivity. Administrators can select the failover mode in the BMC BIOS binary option ROM by selecting “Failover” in the NIC Selection field (see Figure 1).

The network connectivity options for managing ninth-generation Dell PowerEdge servers are designed to provide flexibility for administrators. Administrators can isolate management traffic to a separate network using the dedicated NIC interface or save an extra port by merging management traffic with in-band LOM traffic through the shared NIC and failover modes.

Serial interface

Using the serial interface, administrators can communicate with the BMC or DRAC 5 through a direct serial or external modem connection. Ninth-generation Dell PowerEdge servers have one external serial DB-9 connector on the chassis. This connector is shared between the two built-in host COM ports (COM 1 and COM 2) and the BMC and DRAC 5 serial management ports. This sharing is achieved by means of a mechanism called serial port sharing, which uses a multiplexer to switch between different serial ports.

The serial interface uses two modes of communication: IPMI terminal mode and IPMI basic mode. Terminal mode is intended primarily for direct serial connection operations. This mode is designed so that a simple terminal or terminal emulator can be used to generate requests and receive responses from the BMC. It also supports ASCII text commands, although these are limited to a few commands (such as power control) and system reset options. For programmatic access, basic mode supports a binary interface used by utilities such as ipmish (available on the Dell OpenManage™ systems management software CDs shipped with the Dell PowerEdge server).

Administrators can use the system BIOS settings to configure serial port sharing, which controls how serial ports use the external serial connector. To change these settings, administrators can select the Serial Communication menu (see Figure 2) from the BIOS setup screen (accessed by pressing F2 during the POST). In this menu, the Serial Communication and External Serial Connector settings can be used to achieve flexibility and manageability in serial port usage. The following sections examine example scenarios for using these settings (see Figure 3).

Case 1

In this scenario, the external serial port is connected to the system, and the administrator receives the system console output on this port. The administrator can connect a serial cable and use clients such as HyperTerminal and minicom to manage the system through the serial port.

Case 2

This scenario is similar to case 1: The administrator receives the system console output on this serial port, and can connect a serial cable and use clients such as HyperTerminal and minicom to manage the system through this port. The added advantage is that the administrator can dynamically switch and communicate with the system BMC, view the system health status, and so on. Because the BMC is snooping all the traffic, when the BMC is in terminal mode, the administrator can switch to communicate with the BMC using the escape sequence Esc + Shift + 9. This mode gives administrators the advantage of managing both the host system and the server BMC, because they can now dynamically switch between the two.

Case 3

This scenario is nearly identical to case 2, except that the administrator is initially connected to the BMC. To switch to the host console, the administrator must enter the escape sequence Esc + Q.

The behavior in cases 2 and 3 are slightly different if a DRAC 5 is present on the system. When the system is connected to the BMC and DRAC 5, depending on the DRAC 5 serial console attribute setting, the administrator has the option of using the BMC console

	External Serial Connector setting	Serial Communication setting
Case 1	COM1	On with Console Redirection via COM1
Case 2	COM2	On with Console Redirection via COM2
Case 3	Remote Access	On with Console Redirection via COM2
Case 4	Remote Access	N/A

Figure 3. Example settings for the Serial Communication menu in the BIOS

DRAC 5 serial console	User interface presented
Disabled	IPMI terminal or basic mode
Enabled	DRAC CLI

Figure 4. User interface options when a DRAC 5 is present

(in IPMI terminal or basic mode) or the DRAC 5 serial console. The user interface options are listed in Figure 4.


When using the case 1 or 2 settings, the administrator can also gain access to the system console through a Serial Over LAN (SOL) session. The SOL session preempts any existing serial session (that is, control passes to the SOL session). When the SOL session ends, control returns to the serial session.

Case 4

In this scenario, administrators can manage the system using a command-line interface (CLI) utility called ipmish. This utility is a CLI console application and has no GUI; its commands and options are specified using command-line arguments. It supports OOB access (over a LAN or through the serial port) to a single system, and allows administrators to perform simple server management tasks such as viewing the current power status, viewing the system event log, and performing power control.

For ipmish to work, the BMC must be in basic mode, which enables the utility to programmatically access the BMC. If a DRAC 5 is present in the system, the DRAC 5 serial console option should be disabled using the OOB GUI or the racadm utility.

Flexible server management

Ninth-generation Dell PowerEdge servers offer administrators various interfaces and modes, each with its own advantages. Using these tools along with the Serial Communication settings can help provide flexibility and uniformity in server management. 

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