

Technical Brief

DSI5100: A Better Way to Access, Diagnose and Manage Servers with IPMI

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DSI5100 Appliance

EXECUTIVE SUMMARY

A lack of consistent remote server management tools and interfaces has created unacceptable operational costs for IT groups. In the past, server vendors identified the need to create technologies to address such challenges. On the basis of creating their own unique 'secret management sauce,' each vendor chose to use a different, and thus proprietary, technology. The resulting sprawl of different server management tools coupled with their own 'secret handshake' commands has driven up the frustration and overall costs of all concerned. Finally help is here. It's called the Intelligent Platform Management Interface (IPMI), and it's in a server near you.

Introduced in 1998, and currently in its third major release, IPMI represents a mature and well-proven approach to remote hardware health monitoring and management. IPMI is represented by an industry-wide consortium of over 170 vendors. Members include AMD, Avocent, Dell, HP, IBM, Intel, Microsoft and OSA Technologies (an Avocent subsidiary).

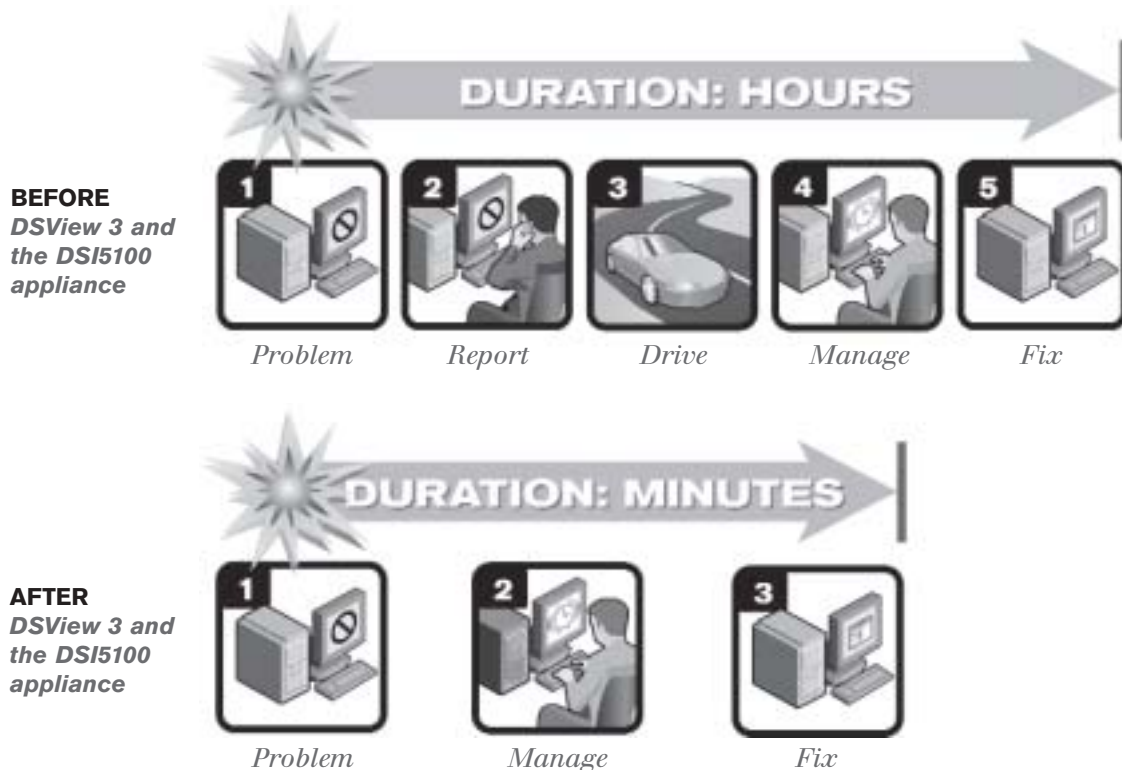
The Avocent® DSI5100 IPMI proxy appliance is managed with the browser-based DSView® 3 management software and provides IT administrators with remote server management. You can take advantage of the IPMI features commonly found in today's servers - many of which use Avocent/OSA IPMI firmware and software.

DSI5100 appliance benefits include health monitoring to increase server availability; scheduling downtime by anticipating service interruptions; and reducing the Mean Time to Repair (MTTR) by performing more efficient problem diagnosis and faster recovery. It's easy to see how small, medium and large companies, as well as service organizations can gain real time and cost savings.

In summary, with the DSI5100 appliance, you can centralize and secure access to IPMI hardware health monitoring and power control without having to visit the rack. This is achieved no matter what the condition – or manufacturer - of the server, CPU or OS.

The DSI5100 appliance is an important and complementary addition to your existing management toolkit. If you have IPMI-enabled servers, you need this appliance today!

IPMI in combination with the DSI5100 IPMI proxy appliance can significantly reduce the Mean Time To Repair (MTTR) for server outages and interruptions.



What is IPMI, and how does it work?

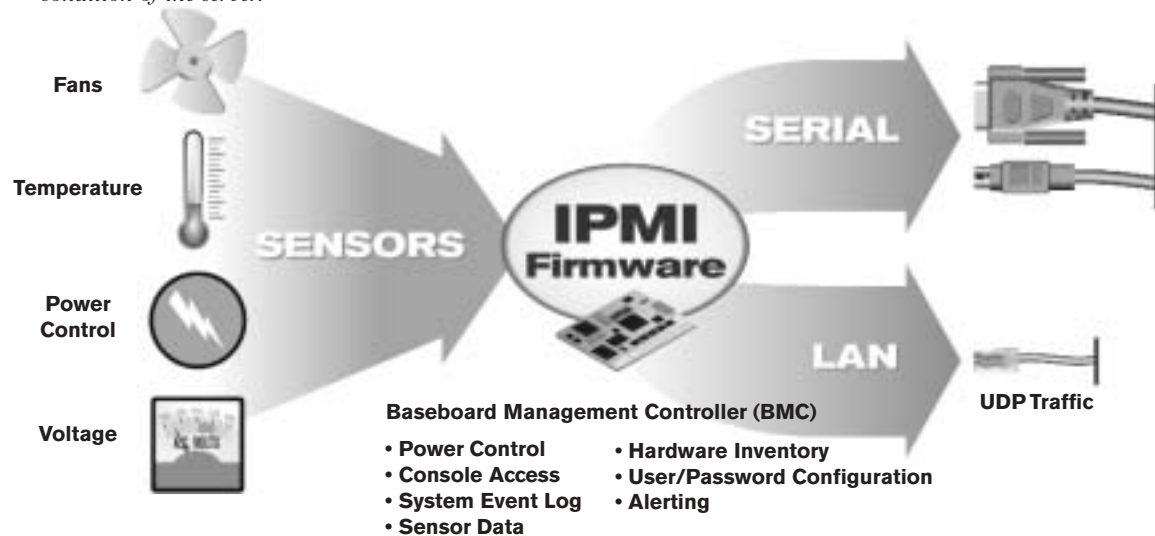
Introduced in 1998, IPMI 1.0 was created by the IPMI forum - an industry-wide initiative that today has over 170 member vendors - including Avocent. They work together to continually update and implement this embedded management specification for servers and other systems such as storage devices, network and telecommunications equipment.

IPMI defines a common and secure interface to how vendors monitor their system hardware and sensors (temperature, voltage, fan, etc.); control system components (power supplies, blades, etc.); log important system events (chassis intrusion, system reset, etc.); and allow you to remotely manage and recover failed systems.

At the heart of any IPMI-enabled server is specialized IPMI firmware - software that runs on a dedicated chip/controller - that implements the IPMI specification. This chip is sometimes referred to as a service processor or baseboard management controller (BMC) and typically exists on the server motherboard or blade. When combined with IPMI firmware, a stand-alone, 'management subsystem' is created. This subsystem works regardless of the type or state of the CPU, or Operating System (OS), which allows for monitoring and recovery even when the rest of the system is unavailable. This approach is commonly referred to as providing Out-of-Band access. You can therefore access IPMI information even when the server's operating system is not loaded, is unstable or is unresponsive.

IPMI functions are performed by sending commands, defined in the IPMI specification, to IPMI firmware. Typically, the commands are sent by a system manager, via a management console, over the LAN using the Remote Management Control Protocol (RMCP) over UDP. In IPMI 1.0, commands could only be sent via the serial port. IPMI 1.5 added new features - the most notable being the ability to send and receive commands over a LAN.

IPMI provides hardware-level monitoring and management of Pedestal, Rack and Blade servers. It offers a tamper resistant and crash proof approach to hardware management, and is independent of the condition of the server.



IPMI firmware not only responds to remote commands but also receives and logs internal server events (system reboot, chassis open, etc.) in the System Event Log (SEL). It also maintains Sensor Data Records (SDRs) that provide information about the hardware by communicating (using IPMI) with sensors (temperature, fan speed, voltage, etc.). A separate area also exists for the hardware inventory (Field Replaceable Units, or FRU), which stores information about the system's hardware components - useful for service and support, and for asset/inventory systems.

By pre-integrating and dedicating non-volatile chips for storing SEL, SDR and FRU information, IPMI firmware is both tamper proof and crash resistant – and most importantly - independent from the rest of the server system. And by being installed, there are no OS agents to purchase, configure, install or maintain. This is referred to as ‘agentless’ management.

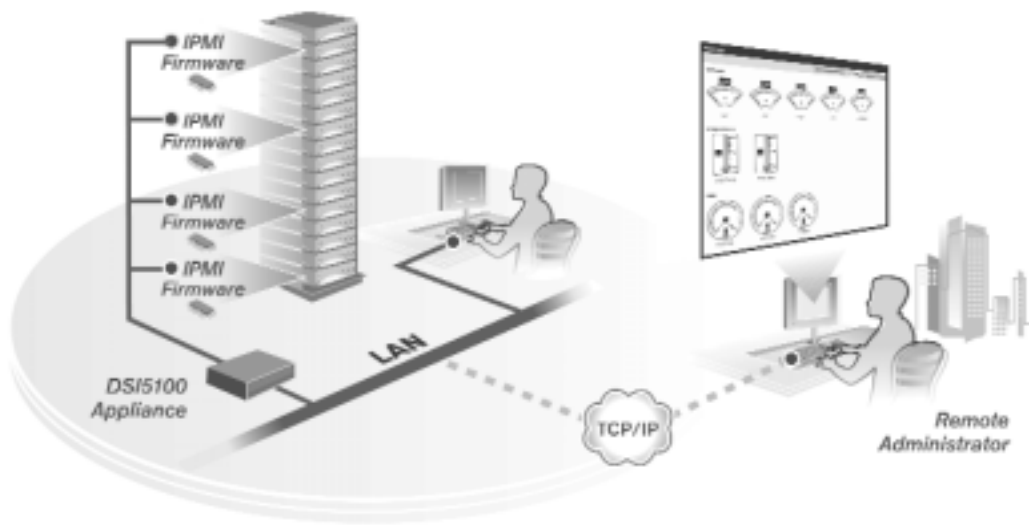
DSView 3 management software control

The DSI5100 appliance is managed by DSView 3 management software to provide a centralized, browser-based interface for secure management of IPMI servers. DSView 3 software authenticates administrator access against an existing security/policy database (i.e. LDAP-based). Communications between the DSI5100 appliance and DSView 3 software uses TCP - traversing enterprise firewalls more easily than IPMI transport protocol UDP.

DSView 3 software is complementary to your existing management. It broadens the management capabilities of your entire IT infrastructure, centralizing and securing access control to your servers' hardware. You can use the same interface to manage IPMI, KVM, serial and external power connections with DSView 3 software.

With this level of remote access, the DSI5100 IPMI proxy appliance is another way Avocent helps you avoid costly on-site service calls by improving access to business-critical servers.

Using DSView 3 management software, administrators can manage power and monitor system health on individual IPMI-enabled servers through the DSI5100 IPMI proxy appliance. DSView 3 software provides a secure, single interface to manage IPMI, KVM, serial and external power devices.



Overview of the DSI5100 appliance in the data center

The Avocent DSI5100 IPMI proxy appliance centralizes the secure monitoring and power management of IPMI-enabled servers. The DSI5100 appliance performs many functions in the data center:

- Power management features allow power on/off, power cycling and graceful shutdown (when enabled by server manufacturer) without the need to purchase or install external power management strips. This feature alone significantly reduces the costs associated with power control in the data center, and works with Windows and Linux servers, or even servers without an OS present.
- Viewing the System Event Log provides additional troubleshooting data – quickly identifying critical system events (server rebooted, OS not responding, chassis open) even if the OS is down.
- Retrieving hardware sensor information can determine the operational status of specific components. For example, IPMI alerts can be generated for increases in temperature, the chassis being opened or a server being rebooted. This hardware knowledge adds an additional level of fault prediction in the data center so that failing (vs. failed) components can be identified early – reducing the chances of unscheduled downtime.
- To correctly identify the failing component, the server's hardware inventory (FRU) can be viewed - supplementing existing asset management systems. FRU information is also useful as part of the initial provisioning process.
- When a technician is sent to replace a failed part, the server's identification LED can be switched on, improving service response time at the rack.

By using the DSI5100 appliance, you can greatly reduce the cost and complexity of power management and speed the troubleshooting process while eliminating travel time during outages, and reducing the Mean Time to Repair (MTTR). Combined with the opportunity to schedule downtime during non-peak periods, and to correctly identify failing components, operational expenses are controlled. The DSI5100 appliance is an excellent complement to your existing Avocent KVM and serial appliances and third-party management systems already in place.

IPMI 2.0 and the future

IPMI 2.0 is the third major release and was announced February 2004. IPMI 2.0's new Serial over LAN (SOL) feature is helpful when remote access to the boot process or OS console is required. IPMI firmware does this by redirecting information destined for the serial port over the LAN - offering a standard way to remotely view the boot, operating system loader or emergency management consoles (for Windows, this is the Special Administration Console (SAC), and for Linux, the serial console).

Enhancements to IPMI authentication (Secure Hash Algorithm (SHA) 1- and Keyed-Hashing for Message Authentication-based) and encryption (Advance Encryption Standard (AES) and Arcfour) add additional security options. Enhanced support for modular systems like blades includes reporting the status of blades (i.e. during hot-swap) and blade partitioning that restricts management to known interfaces.

How to recognize an IPMI-enabled server

Most servers today use IPMI 1.5. Many of these servers also include a variation of IPMI 2.0 SOL. IPMI is typically described as an embedded management feature or interface using IPMI 1.5. This is described as running on a Baseboard Management Controller (BMC) or service processor. Check with your server manufacturer to see if this feature is included.

The benefits of IPMI

To summarize, IPMI provides IT with the following server benefits:

- Remote recovery capabilities (using the existing LAN connection) regardless of system state
- Hardware health monitoring that aids predictive failure analysis
- Remote reboot, power on/off to avoid costly site visits
- Tamper resistant and crash proof and for 'always-on' 24/7 availability
- Reduces Mean Time To Repair (MTTR) by allowing 'diagnose-before-dispatch'
- Interoperable with the existing management tools and appliances
- Supported by the server vendor
- Lowers your management costs as it's free with many servers
- Agentless management - no OS agents need to be purchased, configured or installed

The benefits of DSI5100

- You lower the cost and complexity of remote power control by eliminating the need for an external managed power unit
- You reduce downtime and speed problem resolution by proactively viewing server hardware health using the server event log, sensor and hardware inventory information
- You simplify management using the DSView 3 software graphical interface for different server manufacturers
- You reduce the number of management consoles by using DSView 3 software to monitor and manage hundreds of IPMI servers via multiple DSI5100 appliances
- You gain 'anywhere' management by routing IPMI across firewalls to the DSView 3 software console
- You gain 'anytime' management using health monitoring and power control features regardless of system state

EVERYONE CAN BENEFIT		
USER	CHALLENGES	DSI5100 BENEFITS
SMALL AND/OR DISTRIBUTED ORGANIZATIONS	<ul style="list-style-type: none"> • Price/Performance • Fewer number of administrators • Limited (9x5) remote support coverage 	<ul style="list-style-type: none"> • Paging/Alerting to remote console • Up to 64 servers • Automatic reboots
LARGE AND/OR CENTRALIZED IT DEPARTMENTS	<ul style="list-style-type: none"> • Enterprise-wide management • Secure access • Mass agent deployment & configuration • Multi-server power control 	<ul style="list-style-type: none"> • Firewall friendly • Agentless • Authentication against security policy directory • Integrated power control • Multi-vendor support
REMOTE SERVICE ORGANIZATIONS	<ul style="list-style-type: none"> • Remote site agent deployment • Secure access • Remote reboots • Rationalize management toolset 	<ul style="list-style-type: none"> • Agentless • Secure browser access • Integrated power control • Single appliance view • Multi-vendor support

The DSI5100 appliance meets the needs of many types of organizations.

Supporting the IT Life Cycle

The DSI5100 appliance, in combination with IPMI and DSView 3 management software, can support and enhance the typical IT lifecycle. By offering direct communications with the server hardware, many existing management tasks can be enhanced by utilizing the DSI5100 appliance in the following ways:

Set-up – Provisioning ‘bare-metal’ servers for deployment

- **What:** ‘Bare metal’ describes servers that have no OS or applications loaded. Typically, a proprietary boot process establishes a connection prior to provisioning tasks being run from a console. However, this can take time and requires set-up.
- **Why add the DSI5100 appliance:** The DSI5100 appliance can access FRU information listing detailed hardware information. By retrieving the server’s hardware profile more easily, OS/application imaging is now more specific to the server.

Monitor – Production-ready monitoring

- **What:** Management agents offer OS and application management by monitoring memory usage and performance. However, OS and applications rely on the health of server hardware and OS, and may differ between vendors.
- **Why add the DSI5100 appliance:** No additional software management agents or hardware is required to be purchased, configured, installed or maintained at the remote server. Servers are monitored the same way regardless of vendor. This hardware health information complements existing management information.

Diagnose and Recover – *Diagnosis and recovery of production systems*

- **What:** Problem resolution requires rapid access, diagnosis and recovery to keep availability as high as possible. This is especially difficult in a multi-vendor rack.
- **Why add the DSI5100 appliance:** The DSI5100 appliance can standardize multi-vendor monitoring and management. DSView 3 software displays SEL, SDR and FRU information – speeding problem diagnosis. Remote power control features can eliminate a costly server visit, saving money.

DSI5100 HARDWARE SPECIFICATIONS		
MECHANICAL	Height	1.75 in. (4.45 cm)
	Width	17.00 in. (43.18 cm)
	Depth	11.00 in. (27.94 cm)
	Weight	8.00 lbs. (3.6 kg) without cables
ENVIRONMENTAL	Operating Temp	32 to 104 degrees Fahrenheit (0-40 Degrees Celsius) Humidity 10 – 95% non-condensing
	Storage Temp	-4 to 158 degrees Fahrenheit (-20 to 70 degrees Celsius)
POWER	Operating Voltage	110-240 VAC
	Power Frequency	50 - 60 Hz auto-sensing
	Input	IEC connector on back of appliance
SUPPORTED HARDWARE	Ethernet	100 BASE-T, IEEE 802.3u compatible
	Serial Port	Serial RS232 via DB9 male connector
	Peripherals	
STANDARDS	Approved Agency	UL1950 third edition, cUL, FCC Part 15 Class A, CE, VCCI, C-Tick, GS, GOST, MIC, IRAM

ABOUT AVOCENT CORPORATION

Avocent (NASDAQ:AVCT) is the leading global provider of KVM switching, serial connectivity and Intelligent Platform Management Interface (IPMI) solutions for enterprise data centers, service providers and financial institutions worldwide. Visit www.avocent.com for more details.