



White Paper
Remote Data Center Control
The Benefits of KVM over IP

WHAT'S INSIDE

How to consolidate KVM, serial, power management and environmental monitoring into one easy to use platform

EXECUTIVE SUMMARY

Distributed enterprises and network operating centers require powerful centralized remote control of not only computer systems, but also serial-based devices, AC power, and environmental monitoring devices. In order to easily manage all of these disparate devices, a single comprehensive user interface is necessary to provide point and click connectivity and enforce strong per-user/per-device access and control. Additionally, everything should run over your existing IP network, allowing for remote control and management from anywhere around the world.

INTRODUCTION

It seems that the only constant in a network administrator's life is change. By its very nature, the network operating center is a dynamic system, always growing, changing and evolving. Network administrators are faced with the daily challenge of managing many different and distributed systems across the enterprise. Tasks such as operating system upgrades, software application maintenance and user management can easily consume all of your time. Add into the mix network hardware support, such as routers, firewalls and switches and you are desperately in need of a centralized management solution. Now, take this situation and expand it to include server farms and lights out remote installations and your original problem has grown in complexity by a factor of ten.

As much as the network operating center is dynamic, it requires you, the administrator, to be flexible. You have to add new hardware and systems as business needs require without sacrificing your existing management platform. You have to maintain additional servers in the server farm without creating additional support problems. And you have to do it all without over taxing your existing management system.

A good centralized management platform easily provides a solid return on investment in many ways. It allows you to control multiple devices from a single system, helping to reduce duplicate equipment installations and multiple points of failure. Another is in time savings. You can quickly take control or log on to a piece of network hardware from a single location. For server farms or lights out situations, you can save a lot of time by simply not leaving your desk.

Yet another benefit is that a good management platform will let you control not only PC-based systems but also serial devices, AC power control solutions and environmental monitoring devices. Ever had to drive 50 miles to a locked-down lights out server rack to only power off and back on again a 'hung' piece of equipment? Remote management of the AC power supplied to the hung device would have cut the downtime and technical support time to nearly zero.

User-level security is another necessity for a strong return on investment. Your management platform should secure the access to your devices by leveraging the directory system you already have in place, allowing you to use a single user name and password repository. You should be able to assign device-level rights based on a user's name so that administrators have access to more devices than an entry-level technician. Auditing and logging of all activity is also important so that you can keep track of "who does what" with your network infrastructure.

Reliability of your management platform is of paramount importance. Hardware and software fail; that's a known fact of computing life. Your management platform, on the other hand, must be utterly reliable. You depend on it to connect you to the non-responsive systems so that you can correct the problem. Your management platform has to work all of the time.

It should also take advantage of the ever-present nature of the Internet and IP networks to help facilitate long distance remote access. IP has many advantages in terms of connectivity both inside and outside of the enterprise. IP networks scale very well. You can easily connect thousands of systems together and have them all accessible from a single console. Also, adding or changing IP devices is very easy, providing the flexibility needed in today's data center. All of this adds up to a communication system that can accommodate just about any device.

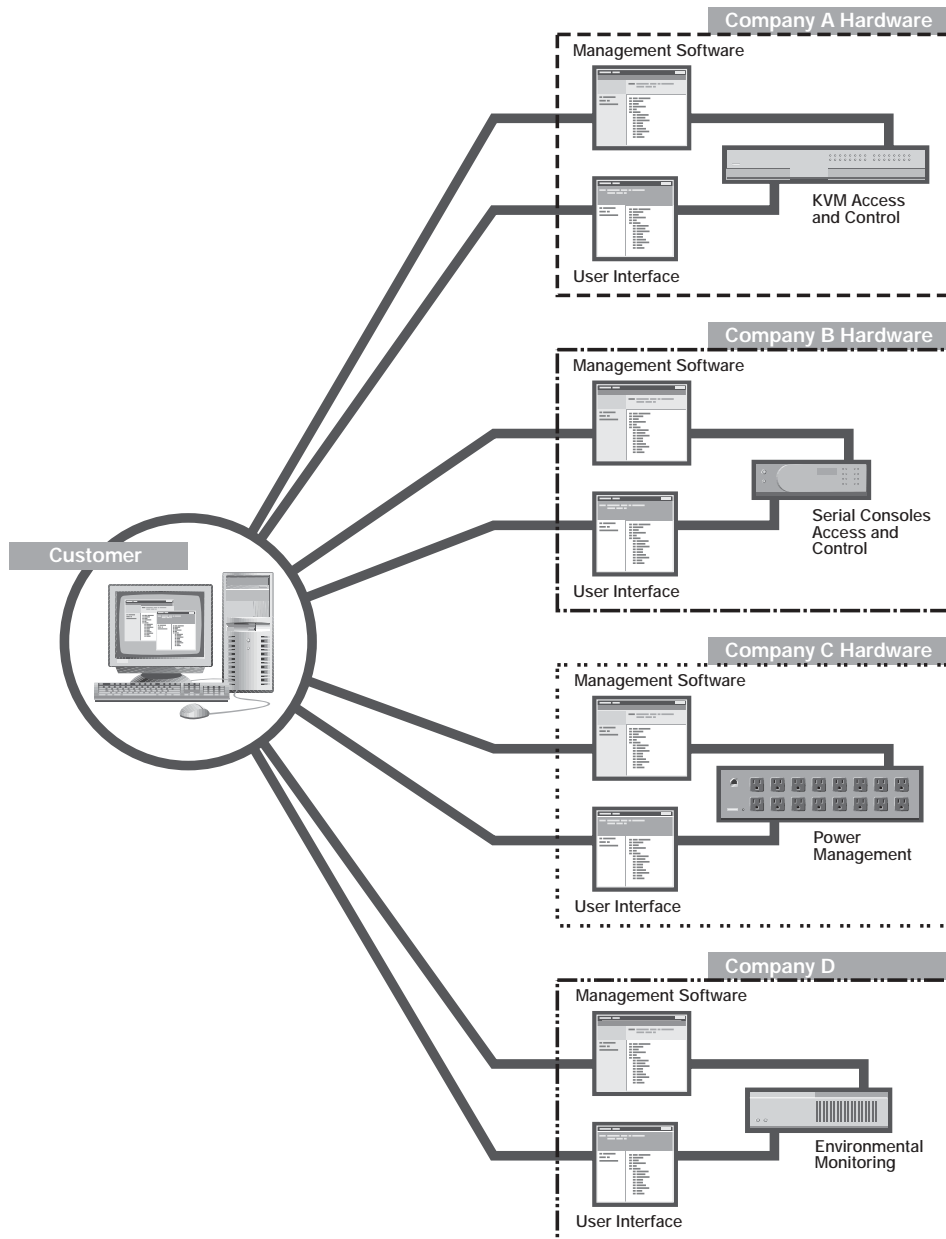
The Avocent DS family of analog and digital remote management devices handles all of these problems and more. Let's look at some typical scenarios to see how the Avocent solution simplifies day-to-day management tasks.

Typical enterprise hardware

As the enterprise grows so does the number of devices that need to be monitored, managed and maintained. Sometimes locating the system you need to work on is as much of a chore as the work itself. For instance, knowing which Ethernet switch needs updating, in a rack of dozens, is more work than the actual updating.

The typical enterprise will have network switches in racks that are normally managed using a Telnet session either over a physical serial connection or via IP. Other devices are infrastructure and firewall appliances. Many of these devices are monitored and managed over an IP network using Web-based or Telnet-based management, or through a third party SNMP monitoring platform. Power management and control (smart AC power strip management) is another important device that needs attention. How about environmental monitoring devices? Many racks have temperature sensors mounted in them to help alert you to an overheating situation before it gets out of hand. You also have KVM switches and remote management software, network appliances, etc. You get the idea.

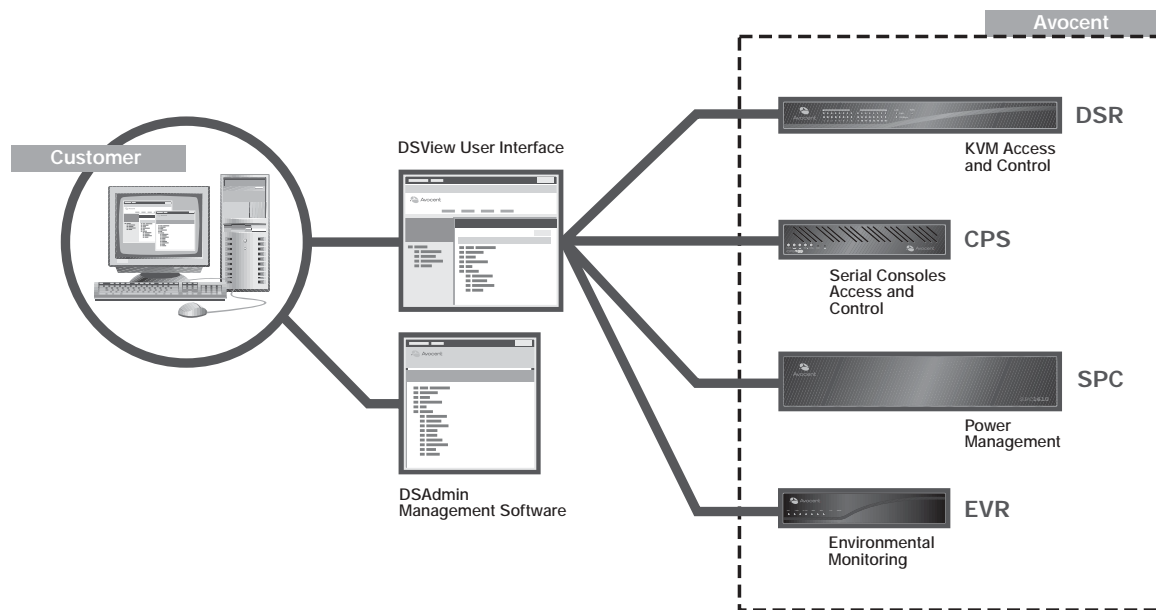
All of these pieces of the enterprise puzzle have their place and each have a specific management need. The problem becomes apparent when you try to quickly and easily connect to any of your servers or other devices from the comfort of the NOC. Because of the nature of the device you are connecting to, you will have to have a connection method specific to that piece of equipment configured on your management console. This means you have to maintain multiple software clients, IP address lists, physical serial connections and possibly other special hardware in order to connect to the device. Now duplicate this among the other network admins or multiple locations and the problem really becomes apparent (see diagram below).



As we dig deeper into this ad hoc management system, we see that the problems don't stop there. Because each system is "an island to itself," there is no centralized user access management between each system. Each connection type must have its own user and password list maintained – no sharing of information. You also won't find any comprehensive logging of user activity. Each device and system would log user access separately, forcing you to manually collate the information into a usable report.

By combining your miscellaneous management tools into a single integrated platform (see diagram below), like that found in Avocent's DS family of management equipment, you can not only centralize your access control to each device, but also provide a smoother, more streamlined interface. The DS Series is a family of products that includes hardware designed to work together to manage KVM connections with Avocent DSR™ products and a wide variety of serial devices with the CPS. In addition, the EVR product monitors environmental conditions (temperature, humidity, airflow, etc.), and the SPC is an intelligent power distribution unit that allows full power control of any attached device.

All of these pieces fit together and are managed by DSView™, the software management platform that facilitates secure access to each device based on your existing directory structure. DSView allows you to click your way through the enterprise so that you can more easily connect to the device you need to manage, be it across the hall or around the globe.



Remote management for the masses

Just about every vendor of every product used in the enterprise and NOC have a way of remotely managing their equipment. Whether it is through a remote control software interface, a browser-based interface, or through a serial connection, you have a way of working on that system without physically being at the system. Now, assume your enterprise has hundreds of servers, dozens of switches and routers, network attached storage devices and security appliances. It's easy to see that your remote management tool set has grown in size and complexity in direct relation to the number of systems you need to manage.

Let's look at a typical example. Server rack Alpha holds 12 computers; 10 are Microsoft Windows-based, the other two are Unix-based. Also in rack Alpha are four UPS units that provide local battery backup power. And at the top of the rack is an Ethernet switch providing network connectivity to the rest of the enterprise. Just to manage this single rack requires at least four different management tools.

When a problem occurs in the rack, you have to first identify which system is failing, where it is located, and then decide how best to connect to it. This can mean jumping in and out of all of the management tools, wasting time and slowing down the repair process. It turns out that the tools we thought would help us manage our network more efficiently are actually getting in the way and slowing us down.

Multiple tools means multiple interfaces, multiple systems to learn and no single point of management. You have to become an expert on each different management solution, and the learning curve, for new hires especially, can take months or even years. Learning curves are further exaggerated because each piece of hardware is a stand-alone piece of equipment that shares little or nothing with the other systems in the enterprise. There is no commonality. The end result is that fixing a problem or simply gathering information about a problem often requires logging into several different pieces of hardware with several different interfaces. This alone greatly slows down the diagnostic process and prevents you from getting the system back online or repaired in the shortest amount of time.

So many tools, so little time

As we've discovered, just because you have the tools doesn't mean they are the right tools for the job. There are a lot of companies that can provide you with remote management tools, but there is no integration between the tools and no single interface to work from. Many companies offer remote control software to a server. That's fine, but what happens if you need to reboot the server and get into its BIOS to make a change? Your remote control tools let you down – they disconnect you as soon as the server shuts down.

A KVM solution handles this situation without any trouble, but this too can have its limitations if there is no single unified interface. Just because a KVM vendor allows you to daisy-chain or cascade KVM switches doesn't mean it is going to be any easier to navigate through the switching matrix. Many times you are left using notes to know how to locate the desired server through all of the ports and switches. You need your KVM management tool to provide a comprehensive list of all the servers connected to it so that you can easily select and access them.

Now factor in other network hardware such as routers, switches and appliances that have serial ports. You will lose connectivity if you need to reboot a router. And that means you can't watch for errors or other trouble during its startup. Relying on an "in-band" Telnet connection to a crashed or hung serial device is simply not possible. A serial over IP device would handle this problem easily, allowing you to monitor and connect to the hardware without physically going to the rack with a laptop and connecting a serial cable to it.

Forward thinking network administrators must also keep in mind that future upgrades to accommodate network and other advancing technologies are always on the horizon. Some KVM products may work well today, but are unable to cope with technology advances without forklift upgrades. By contrast, IP is the communications standard for the foreseeable future. As long as a device can accommodate an IP address, it can be controlled and monitored with an Avocent digital KVM over IP system. For additional future proofing, Avocent KVM over IP firmware and software is flash-upgradeable.

The complete solution from Avocent

Avocent has the right combination of hardware and software to provide you with a unified interface, centralized user management, and connectivity to all of your servers and serial devices. Additionally, with the SPC power management over IP and the new EVR environmental monitoring devices, Avocent gives you total control over all aspects of your enterprise, allowing you to remotely power off devices and also to monitor environmental conditions such as temperature, airflow and humidity.

KVM - Avocent invented KVM over IP. Avocent switching systems support multiplatform, multilocation, multidevice installations, all over a standard IP connection. The feature rich DS Series of network appliances simplify access and control with DSView management software, allowing you convenient Click and Connect™ control to all of your data center devices --- all from a single screen.

The latest version of DSView includes enhanced security features and administration benefits, including detailed audit logs, SNMP traps and secure mode for the CPS product line. For flexible access, the DSR switches combine analog and digital connections into one switch to allow local access at the rack and remote access from anywhere in the world. Intelligent CAT 5 interface modules drastically improve cable management and provide dedicated emulation for each attached device. The intelligent user interface allows users to easily navigate and access everything that is attached.

Serial over IP - The Avocent CPS provides secure remote access to the serial console and configuration ports of a wide variety of equipment including: headless servers, network equipment, telephone switching systems, storage devices, power distribution and management hardware. The CPS provides the same level of control that a laptop and a serial cable provide when directly connected to the configuration port of a piece of hardware. The bonus is that it provides this level of control from anywhere.

The CPS also offers hardware break suppression that is necessary for managing Sun servers. And, it offers online and offline buffering that can be used to view console port history of the attached serial devices. For failed network equipment the CPS offers external modem access to allow for maintenance access to correct problems with any of the attached network equipment. The CPS works in unison with other Avocent appliances such as the DS1800, the DSR Series of switches and the SPC to enable administrators to manage a wide range of data center devices through local access at the rack or remote access over IP connections.

Power management over IP - Avocent's DSView software allows for seamless power control at the server or target list. Looking at the main list of servers and serial devices listed in DSView, a user can right-click on a server name and the "power state" is presented with three options (On, Off, or Reboot). DSView software allows the user to create an association between a server name and a specific SPC outlet or multiple SPC and multiple ports for equipment with multiple power supplies. The SPC also measures the total power load that is connected. This allows operators to know exactly how much power is being used during initial installations or when adding additional equipment to an existing rack.

A wide variety of SPC models are available to handle global power requirements as well as vertical and horizontal mounting options. Power distribution and control is a requirement in every data center. With the DS Series it becomes an integrated part of a total solution.

Environmental monitoring - Avocent's newest addition to the DS Series is the EVR monitoring appliance. The EVR is used for the management of the environmental and security conditions in the immediate vicinity of servers and network devices. The EVR has built-in internal sensors and

additional ports to connect external analog and digital sensors. The external sensors allow customers to choose what they want to measure and also choose the locations of the sensors. The EVR unit collects data from these internal and external sensors and compares this data against user-defined parameters, issuing alarms, generating reports and acting upon conditions and events.

Most network management tools only let you know there was a problem after it occurs. With the EVR, you can actually help prevent hardware failures or equipment damage by remotely shutting down remote equipment via the DS Series, KVM, SPC and CPS units. Proactive management and early notification is yet another way Avocent is making life easier for the network administrator.

The glue that binds it all together

The heart and soul of the DS system are the DSAdmin and DSAAuth applications. They provide centralized network access, control and security for the DS Series appliances and also user access auditing. DSAAuth maintains the per-device permissions and contact information and also handles the user authentication, making inquiries against a Windows NT domain or Active Directory. DSAdmin allows you to configure per-device contact information and permissions.

Avocent's DSView software management package allows you to remotely control all of your network connected devices using a simple "point and click" interface. DSView uses IP connections so that you can remotely manage or even reboot a server from the NOC, your desk, or from anywhere you can get on the Internet.

With DSView, you can have a multi-windowed display of your devices. This allows you to control multiple devices at the same time without having to shut down a session to start a new one. It also supports SNMP MIB-II for integration with your existing enterprise management tool and can also send SNMP traps to alert you to user-defined alerts. Audit logs are stored in the common CSV format for easy analysis.

A unique feature of DSView is its ability to distribute new firmware flash updates to multiple DSR and CPS devices simultaneously. This allows you to quickly and efficiently keep your devices up to date without having to manually update each one. Also, each user only sees a filtered list of devices available to them based on their security level, and each device's status is displayed in an easy to view color-code.

In the end, there is only one

As the network administrator, keeping up with your remote maintenance chores can be a real burden, especially when your enterprise spans server racks, buildings or even continents. There are many companies that provide separate tools for doing remote management, but there is only one company that has a unified platform for all of your management needs.

Avocent has taken the management headache out of remote management by creating a single comprehensive user-interface for all of your remote access requirements. Avocent is the only company that offers a point-and-click interface for device control and user-rights management that is completely integrated with the remote hardware. Security and ease of use are key components to the Avocent solution, but most of all, it is the total consolidation of KVM, serial, power management and environmental monitoring into one easy to use platform that makes the difference. When all is said and done, there is only one company that has the solution to all of your remote management needs.

About Avocent Corporation

Avocent (NASDAQ: AVCT) is the leading worldwide supplier of KVM (keyboard, video and mouse) switching, remote access and serial connectivity solutions that provide IT managers with access and control of multiple servers and network data center devices. Avocent's KVM solutions are distributed by the world's largest server manufacturers and installed in Fortune 100 companies around the world. Visit www.avocent.com for more details.



Corporate Headquarters
4991 Corporate Drive, Huntsville, AL 35805
TEL 800.286.2368 FAX 256.430.4030
www.avocent.com

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