Avocent™

The Power of Being There™

White Paper

Secure KVM Access and Control

WHAT'S INSIDE

The 10 facts every network administrator should know about secure IP-based KVM systems

EXECUTIVE SUMMARY

Building a solid IT infrastructure is a huge endeavor. Maintaining the IT infrastructure is an even larger, ongoing responsibility. Network administrators in today's fast-paced, high-traffic computing environments are on the front-lines, maintaining the computing resources and connectivity on which entire companies rely. Today's tight budgets mean that network administrators are under pressure to maintain critical corporate computing resources more efficiently and economically than ever. To do that, they need solutions that bring immediate benefit at a reasonable initial cost and a reasonable lifetime cost. Network administrators need products that work for them now and will take them into the future - products that will help the data center grow, and grow with the data center.

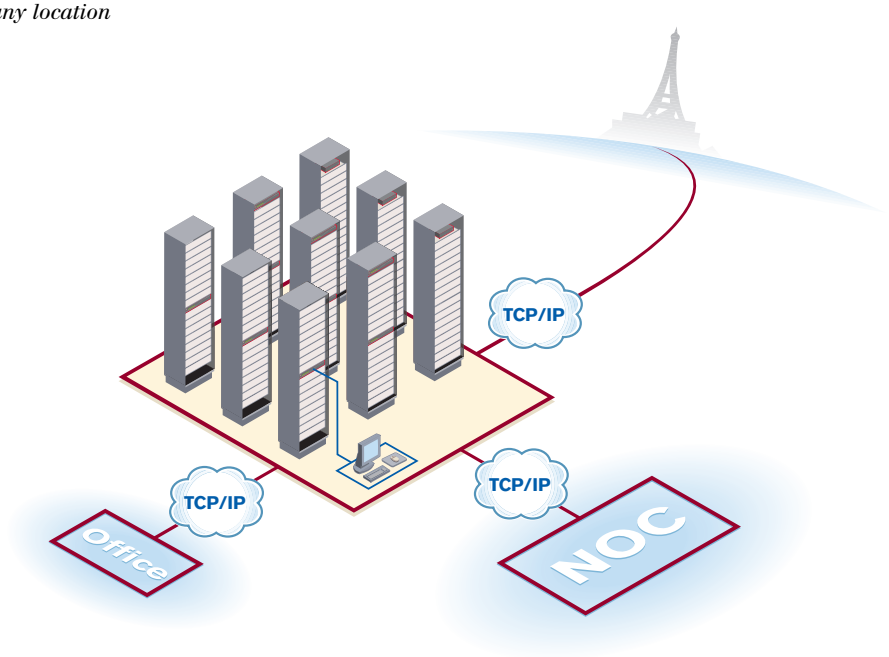
KVM technology can have a huge positive impact on the budget of an IT operation and how it functions. For example, a cost comparison conducted by Avocent for one growing company showed that the company could save as much as $130,000 by just updating the current KVM switching system for their next 160 servers. Network administrators with an interest in boosting efficiency without boosting budgets should take a careful look at today's KVM technology.

FACT 1: KVM makes the systems administration task more manageable.

An IT staff's ability to manage network infrastructures is contingent on immediate, hands-on access to their network devices. KVM solutions put network equipment at administrators' fingertips -- even if some of that equipment is thousands of miles away. It does this by providing virtual keyboard, video and mouse (KVM) access to each device from a single workstation.

The problems facing a network administrator can include distance limitations, cabling requirements, platform support and security. All affect the ability to troubleshoot and remedy problems when they arise, or to prevent problems through proactive maintenance. The right KVM solution maximizes productivity and minimizes downtime. Administrators can securely access the functions they need to diagnose, control and fix network devices, regardless of the platform or location.

As shown in the illustration, this IP-based KVM switching system eliminates distance limitations by providing digital technology for IP access from any location across the globe.



FACT 2: There are KVM switch solutions for the desktop, the enterprise and everything in between.

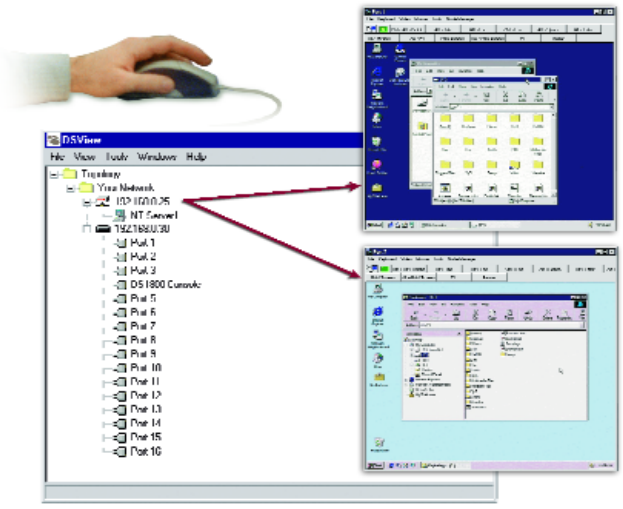
KVM technology can have as great an impact at the desktop as it can across the enterprise. For example, KVM switches sized to handle as few as four servers can make a world of difference in a small office by eliminating the need for extra monitors, keyboards and mice. The range of solutions for small-to-medium-sized businesses include entry-level matrix switching; digital, IP-based systems; and combined digital/analog systems for the ultimate in performance and flexibility. For the large enterprise, digital KVM solutions are infinitely scalable and make it possible to centralize IT staff by enabling access and control of devices on the LAN or across the WAN.

FACT 3: The right KVM system saves space and money by eliminating redundant peripherals and cabling.

KVM technology frees-up space and cleans up the office or data center by consolidating server control to one or several server access stations. The choice is yours. This can eliminate the need for a keyboard, monitor and mouse at each server - potentially taking the place of tens, hundreds or even thousands of keyboards, mice and monitors.

With KVM, multiple users can access multiple servers from multiple locations - regardless of platform. Access to the attached servers can be from a variety of dedicated user stations of a local KVM matrix switch. Or, it can feed directly from an existing desktop computer using client software or a browser to communicate with a digital KVM switch. Products with integrated IP-based KVM technology reduce the clutter even more. They use the existing network infrastructure which eliminates the need to run several dedicated cables between KVM switches to expand the system.

As shown in the illustration, Avocent's advanced DSView™ centralized management tool provides point-and-click access to any connected device for monitoring and controlling the managed devices.



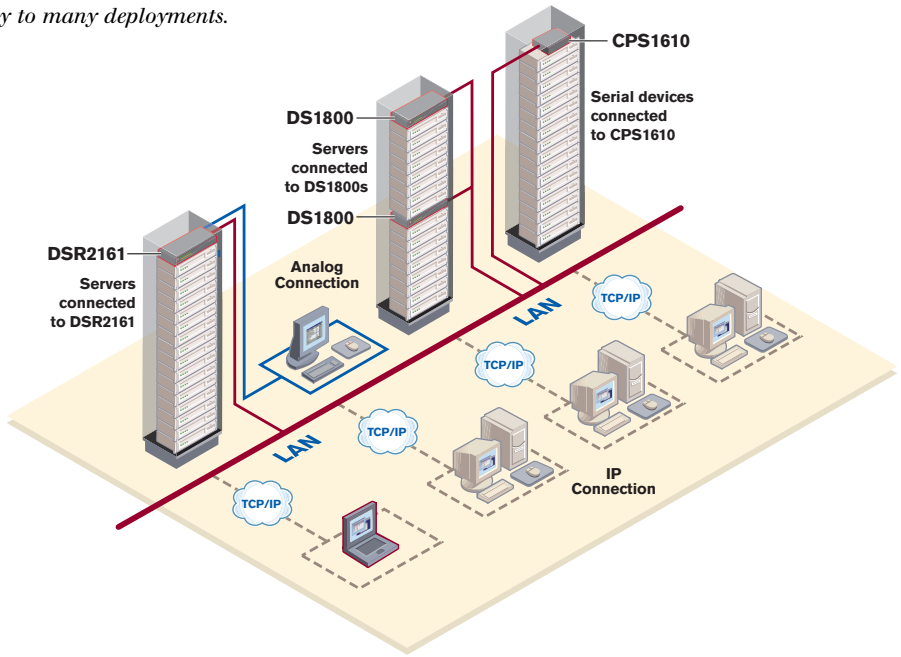
FACT 4: KVM is a more powerful solution than simple remote control software.

KVM switching systems provide administrators a solution that is not dependent on the health of the server, the type of operating system or any remote software application running on the server. On the other hand, some remote control applications have limitations that can render them useless when they are most needed. In order to use remote control software, each device being managed must be running a component of the software. If the device is experiencing a problem, then the remote control software may not function properly. KVM does not have these limitations.

Remote control software running on a managed server also requires that the server's operating system is fully booted and running. There are many cases where a network administrator wants to monitor, control and even interrupt the boot process as it unfolds. This is impossible with most system-dependent remote control software. Such software can also add to administrators' workloads by introducing additional software maintenance and update tasks.

With KVM, the boot process can be managed in the exact same manner as if the network administrator were sitting in front of the managed device. And, after making necessary changes to the device's configuration, the network administrator can monitor the entire process as the device reboots.

As shown in the illustration, KVM solutions provide access and control of multiple servers. Considerations for multiple locations and multiple users are key to many deployments.



FACT 5: There are multiple choices in advanced analog and IP-based KVM for controlling your local and remote server population.

The choice of KVM technology for a given application will depend upon several factors, one of the most critical being the balance between requirements for both local and remote access. In environments where servers are racked or grouped in data centers, analog matrix switching can provide good multi-user, multi-platform control for systems administrators. But if your servers or data centers are distributed around a campus or around the world, use a TCP/IP connection for digital control via an easy-to-use Windows interface. This approach will streamline user access and management tasks.

IP-based digital KVM solutions enable network administrators to easily access any connected device, regardless of location, over industry standard TCP/IP (Ethernet) network connections. A powerful management connection, these digital KVM solutions allow full control of all devices on the network, right down to the BIOS level, and are not dependent on the operating system.

Advanced analog matrix switching systems remain a viable and relatively inexpensive means of managing racks of servers from several KVM user stations. The best matrix systems include automatic video compensation, graphical on-screen display and centralized management software. All of these technologies simplify and speed-up installation, expansion or management tasks, such as flash updates and channel/user list additions or changes.

All-in-one analog and digital IP-based KVM solutions offer the best of both worlds, allowing administrators to have local access from within the data center, and IP-based access for extended or remote access. A solution that provides both an end-to-end digital and analog KVM in a single system has the advantage of using common software, administration, access controls, etc. This is a much more streamlined and convenient approach than maintaining the KVM switch and the IP device as separate products.

FACT 6: A fully-integrated KVM system eases administration.

KVM switching is a much more effective solution for managing remote devices when it is conducted through integrated hardware and software technology. Solutions built from separate remote hardware products attached to conventional analog KVM switches require multiple interfaces to master and multiple consoles to view. Solutions that are not well integrated often require the KVM switch and attached IP devices to be managed separately, using different software or interfaces. This can make updating the system, changing user permissions, or upgrading the firmware very difficult and time consuming.

Choose a solution that has a well-designed, integrated approach to managing the devices on the network *and* the KVM system itself. An integrated, end-to-end IP-based KVM solution that incorporates compression, encryption, centralized management and other key functions will be more reliable, scalable and effective than a piecemeal, multi-vendor system.

FACT 7: Solutions that use centralized management software are easier to install, manage and maintain.

Some systems require that manual settings be made to each piece of equipment, and often use separate user interfaces for each. That's too much work. Centralized management software provides a clean, easy-to-use interface and smooth remote device management. Features to look for in the management interface include:

- An Audit Log - so you can store and export information about user switching activity
- Network enabled flash updates that eliminate the need to physically connect to each piece of hardware
- Granular security permissions - to allow users to be assigned access to specific servers in the KVM system
- The ability to manage a variety of hardware in multiple locations - avoid solutions that require management software for each different piece of hardware and require a physical connection to each piece of hardware. It creates an impossible situation if multiple locations are involved.

FACT 8: The best KVM security solution contains auditing, event logs and advanced administration features.

One of the advantages of a KVM system is the ability to maintain a "lights-out" server room. Because you can extend access to your servers, you can keep your data center under secure lock and key and limit physical access to the hardware by unauthorized personnel. If this is important to you, your KVM system should give you advanced security features for individual users. In order to run a "lights-out" facility, your KVM system must perform with absolute reliability and deliver a proven security model under any circumstances.

Ask if the system includes multiple levels of security. Does it leverage Windows NT/2000 security in addition to providing multilevel authentication as well as encryption? Does the KVM system provide the flexibility to assign individual user rights, or does it only assign permission by group settings? How about the packetized KVM data - is it encrypted to prevent "snooping" of your sensitive management information?

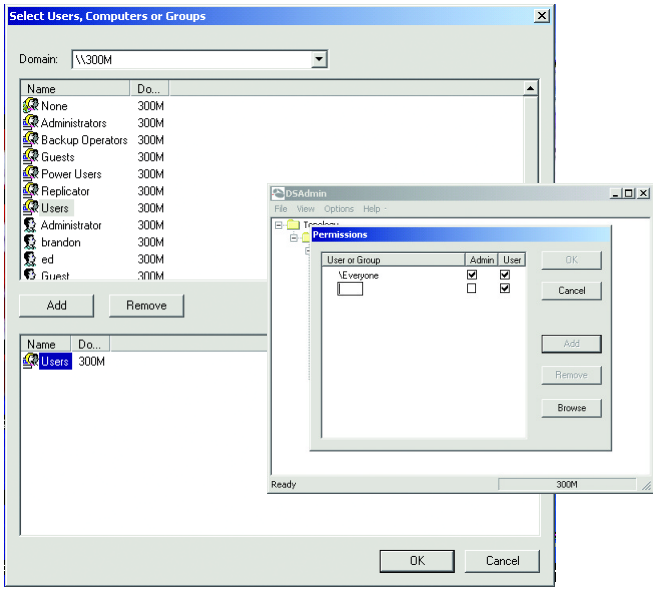
Regardless of whether you choose to deploy your KVM system in the data center or miles away, your switching system must provide secure access, control and auditing. When it comes to how security is handled in KVM solutions, not all systems are created equal. In addition to features such as privacy and stealth mode, find out if the system provides detailed reporting and event logging. For example, does the KVM system provide you with the activity log from any hour of the day so that you can track users and events in the system? Make sure the system management tool implements data encryption and compression along the entire path of the connected session. Keystroke and mouse movements should be subjected to Secure Sockets Layer (SSL) encryption. Ask if encryption keys, to further enhance security, expire with the termination of each KVM session. They should.

When you integrate a KVM switch into your network, it inherits many of the aspects of the security model you already have in place. With IP-based systems, users access a switch that is not connected to an Ethernet port on the target computer, only the KVM port. Any system that provides this type of powerful KVM access must also feature multilevel passwords, authentication and the strictest security model. Finally, ask if the KVM system leverages the industry standard features of Windows already being used in your network with the multilevel security in the vendor's switch.

In summary, the security functions of an IP-based KVM switching system should include:

- A configuration set-up that will accept only those people included in your authentication database
- An audit log file that records every access and disconnect from the server
- Data encryption and compression along the entire path
- Keystroke and mouse movements being subjected to full Secure Sockets Layer (SSL) encryption
- Encryption keys that expire with the termination of each KVM session

As shown in the illustration, Avocent's DSAdmin includes advanced security benefits with user authentication and restricted access, which are critical to maintaining permissions and security in today's distributed networks.



FACT 9: Digital IP-based KVM makes expansion easy.

Products with integrated IP-based KVM technology make expansion and installation easier by reducing the amount of hardware required. And, they eliminate the need to interconnect all of the KVM switches directly together. The expansion capabilities of digital KVM switches with integrated IP technology are virtually unlimited.

Try to take into account how often you will need to add servers or users. Would you prefer to access your data center devices using TCP/IP connections or would you rather use direct analog connections? Is access at the rack enough, or do you also need to control servers from 100 feet away or hundreds of miles from your data center?

For growing installations with hundreds - or even thousands - of servers, make sure your KVM solution provides a matrix switching fabric with non-blocking access. Ask for TCP/IP connectivity so that adding users and servers is as simple as adding a device on your network. As your data center grows, know that your KVM switching system can grow, too, because it is based on your existing infrastructure.

How easy is it to add additional users? Do you have to predefine the number of users that will access the system? An IP-based system leverages your network infrastructure, therefore adding additional users should be as simple as adding an IP address. Your KVM solution should be able to scale with your existing network infrastructure. Also, determine if flash upgrades to the hardware are included with the system.

You should also expect to have a graphical user interface (GUI) so that you would not have to retrain your staff after each upgrade or reconfiguration. A standard Windows® application should provide a familiar interface for busy IT staff that need to quickly access and control any network device from just one screen. Request software that easily fits in with your existing network and desktop operating system.

FACT 10: Service and support are very important when choosing a KVM system.

Your KVM system is only as good as the service and support received from the vendor. The Avocent website has 24/7 access to a searchable knowledge base where you will find a library of technical notes on Avocent products. Product manuals are also available online. Technical assistance is only a phone call away or available at the website through an Online Request Form. A customer support technician will answer your request by email or phone.

Avocent's integrated Customer Support Programs provide customized technical solutions and a wide range of technical services. The Avocent technical package includes on-site design, installation and configuration management.

All Avocent products include a standard two-year warranty and optional extended warranties for an additional one or two years of coverage.

Avocent has switching systems targeted for specific needs, from desktop to data center

From solutions that reduce desktop clutter at home or in the office, to solutions that provide remote control to any number of servers or network devices, Avocent offers the broadest portfolio of KVM solutions. And, they are *proven solutions*. Not just making connections, but making them usable, Avocent endeavors to provide the ultimate KVM switching systems, with benefits that include:

- Integrated, tested hardware and software.
- Centralized management software to help managers quickly survey and troubleshoot their equipment.
    - **DS Management Software** is client-based or browser-based and makes it easy for network administrators to manage multiple devices - allowing them point and click access and control. From their desks or on the road, they can monitor applications, reconfigure software settings and even reboot systems. The DSView application is highly intuitive and allows for management of both servers and network hardware.
    - **AMWorks™** is a Java-based analog administration tool that supports customized server names, creates user profiles and provides multi-level security of multi-platform server environments. It allows network administrators to set multi-level access to servers with password protection for each user. It also provides a log of system activity.
    - **AVWorks™** is a client-based management utility that provides click-and-connect access to servers from a wide variety of operating systems. It features auto-discovery, wizard-based installation and context sensitive on-line help. The software includes Avocent's patented OSCAR®, the On-Screen Configuration and Activity Reporting tool.
- Access and control tailored to your needs whether your servers are under one roof or spread across the globe
- High level security, with permissioning, client authentication, encryption, administrative integration and audit log capability.
- Scalability. No data center is static. Expansion is inevitable. Avocent has a flexible solution whether you are adding several servers to the existing management network, consolidating servers or adding entirely new remote locations.

For server rooms and enterprise-level data centers

Designed for demanding IT environments, Avocent's DS Series offers reliable digital and analog switching solutions for multi-platform, multi-location and multi-device access and control. Using TCP/IP connectivity, the DS Series simplifies access to servers and other network devices by putting the entire data center at your fingertips. From access at the rack to access at your desk, the DS Series provides an unmatched solution for today's data center environments. The DS Series includes DSView, DSR800, DSR1161, DSR2161, DSR4160, DS1800, CPS and SPC.

The next generation DSView 2.0 management software offers enhanced system security and increased user convenience with a consolidated view of all connected data center devices via the DSR™, DS1800 and CPS network appliances:

- Provides convenient browser-based access to targeted devices from anywhere
- Provides cross platform client support
- Telnet viewer simplifies troubleshooting and debugging server problems
- Central authentication and audit provides added system security
- Allows secure authentication with HTTPS, 128bit encryption
- No special client software to install or maintain

For small to mid-sized data centers

AutoView® 1000R and AutoView 2000R KVM switches expand the AutoView product line with combined local KVM switching and remote IP-based access in a single switch. With end-to-end CAT 5 connectivity, flexible access, and convenient on-screen management, AutoView is an all-in-one KVM analog and digital switching solution. AutoView provides an analog port for local access and an Ethernet port for extended and remote IP-based access. Using IP connectivity, AutoView adds an extended user anywhere in the data center or a remote user from anywhere across the globe. For CLICK and CONNECT™ control of multi-platform servers, AVWorks administration software is bundled with each switch.

The AMX™5010 is a 16x64 analog matrix switching solution that utilized Avocent's field-proven technology to provide unmatched advancements in increased user access and efficient scalability. It increases the number of users with simultaneous access and its highly scalable architecture makes it easy to add and support more servers. The AMX5010 supports all major server platforms. Avocent's advanced AMWorks software is also included with each AMX5010 switch to provide the benefit of central administration.

The multi-user, 16-port AutoView 2000 integrates Avocent's field-proven analog KVM switching technology with advanced cable management, flexible access and a patented, next-generation user interface. A unique benefit of the AutoView 2000 is the AVRIQ smart cable interface. The AVRIQ CAT 5 interface automatically assigns and retains unique server names for each attached server, which simplifies installation and eases re-configuration. With advanced cable management and flexible access for two simultaneous users, AutoView 2000 is an unparalleled KVM switching solution. The AutoView 2000 conveniently supports all major server platforms and features powerful on-screen management for system configuration and easy server selection.

For the home office and desktop, including secure environments

Avocent's SwitchView® product line can save desktop space by giving you push-button control of multiple computers from a single set of peripherals. Designed for small businesses or home and small office use, Avocent's SwitchView SC, SwitchView DT, SwitchView MP and SwitchView OSD switches will reduce workstation clutter.

You also save money on hardware. Depending on the SwitchView in use, you can control two to eight PCs from one keyboard, monitor and mouse. Features include an easy menu-driven setup, multiple switching methods, the ability to add or remove servers without powering down and an internal power supply. SwitchView is the answer if you need a compact solution to save money and valuable desktop space.

Avocent's SwitchView SC was specifically designed for secure environments where both classified and unclassified computers are accessed from one set of peripherals. With SwitchView SC, you can safely switch between eight computers - all from one keyboard, monitor and mouse. SwitchView SC provides four separate channels so users can access classified and unclassified networks without the fear of unwanted data transfer.

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.

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