



White Paper

The Definitive KVM Buyer's Guide

WHAT'S INSIDE

How to choose the best KVM switching system for your data center

EXECUTIVE SUMMARY

As corporations seek ways to cut costs and boost profitability, the streamlining of business processes continues to place unprecedented demand on corporate networks. The handful of servers deemed adequate not long ago has exploded into dozens, or hundreds. And the closet that once housed these servers has grown into a full-fledged data center.

As an IT manager charged with maintaining, upgrading, and expanding the data center to meet ever-changing corporate needs, you already know that doing so in an efficient, economical manner is crucial. Avocent provides server management solutions that improve IT administrator productivity while increasing data center security. Avocent KVM switches eliminate redundant peripheral hardware, recovering valuable space for more advantageous use.

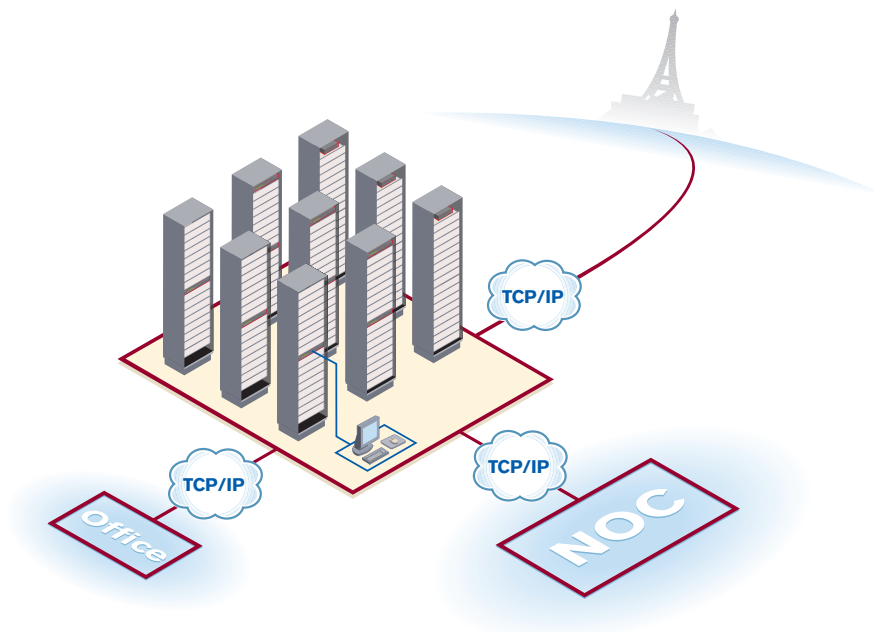
In this document, we'll examine the different types of KVM technologies, analyze which is best suited for your data center, and identify the qualities you should seek when choosing a KVM vendor.

What is Keyboard, Video and Mouse (KVM) Switching?

KVM switches allow multiple servers and other devices to be controlled from a single keyboard, monitor and mouse. With a KVM solution, data center technicians can control hundreds of servers and serial devices via a single console, whether they are across the hall or halfway around the world.

A modern data center, consisting of more than 50 servers in a single location, presents special challenges for its security-minded and budget-conscious IT manager. The right KVM solution must allow "lights-out" operation with unfettered access by multiple users, yet prevent access to those who are not authorized. It must be scalable, ready to support additional servers and network devices on a moment's notice. The right KVM solution must provide a measurable return on its cost. Finally, the manufacturer of a KVM solution should be an established technology leader, financially secure, and offer consultation and system-design services supplemented with training and 24/7 interactive technical support.

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.



Benefits

KVM switches save space, reduce costs, enhance productivity and provide a high degree of security.

The most visible benefit of KVM switching is the elimination of keyboards, monitors and mice from each server. New servers can be purchased without these unnecessary peripherals. Space in the data center is conserved, allowing server density per square foot to be increased. Servers need not be homogeneous: despite their substantial differences, Windows, Unix or Linux devices can be controlled from the same keyboard and KVM switch, enhancing users' efficiency.

Less evident but equally quantifiable is productivity loss associated with travel time. With a KVM solution, IT technicians need not leave their desks and walk, drive or fly to the server room, except for rare instances. As a side benefit, server rooms can operate in "lights out" mode, under lock and key, enhancing physical security, and eliminating the cost of continuous lighting.

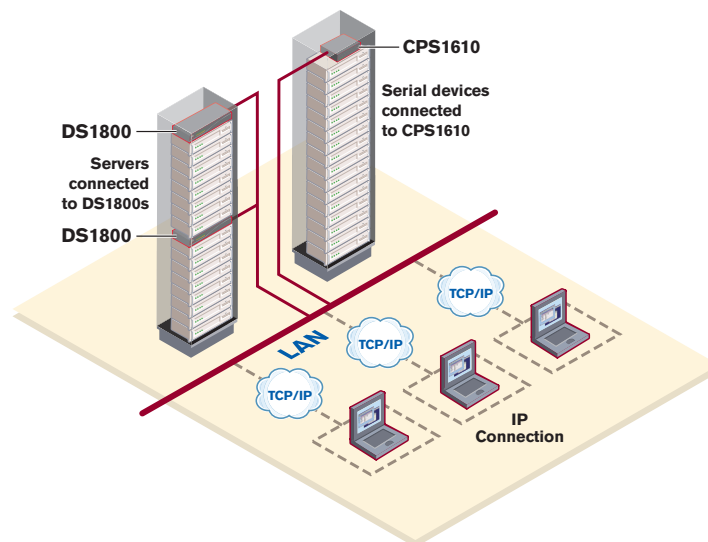
Types of KVM

KVM switching solutions employ either analog or digital technologies, or sometimes a combination of both. Proximity and quantity of servers, and the number of users accessing them, are key factors in determining which solution is the best for your data center.

Avocent offers analog and digital KVM solutions, along with other switches that incorporate features of both.

- Analog switches are the best choice for controlling nearby servers, when remote access to them via a network connection is unnecessary.
- IP-based KVM switching systems operate over standard IP networks, allowing authorized users to control servers in the data center from anywhere in the world.
- Switches that combine IP-based KVM and analog connectivity are a good choice when both local on-site and remote access control of servers is needed.

As shown in the illustration, Avocent's DS1800 KVM OVER IP™ network appliance supports multi-platform server environments. The CPS network appliance supports Serial Over IP access for network devices such as power distribution units and routers. All connected devices can be accessed through Avocent's DS management software.



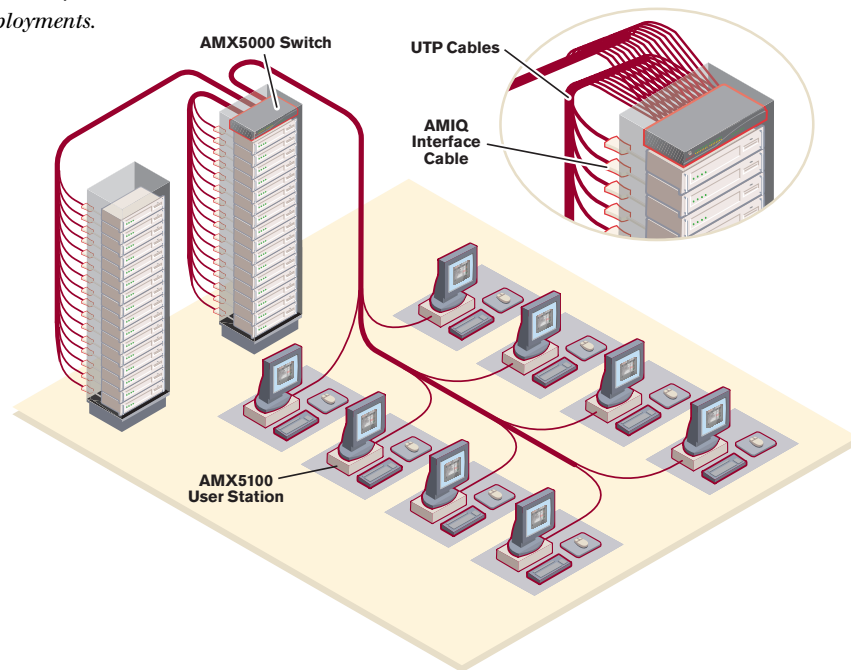
Analog Solutions: Multiuser local control

Choose an analog KVM solution when your data center's users and servers reside within a centralized location. Ideal for access at the rack and distances to 1,000 feet, analog KVM offers multi-user, multiplatform support and simple plug-and-play installation.

Analog KVM operates completely independent of the network; routing keyboard, video and mouse signals along a dedicated cable pathway, from server to KVM switch to user. The cable can be a traditional KVM style that essentially welds separate keyboard, video and mouse cables into a larger bundle. Better yet is new technology, developed by Avocent, which replaces bulky KVM cables with thin, easily routed Category 5 (CAT 5) cable.

Recognizing that the single-user KVM switches of the past do not meet the needs of the modern data center, Avocent offers the AMX family of analog KVM switches. These products support a matrix consisting of eight simultaneous users accessing up to 32 local servers, all in just 1U of rack space, and up to 512 using 21U of rack space. For data centers with more modest requirements, Avocent's single and double-user AutoView products provide access to 24 or more servers.

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.



IP-based KVM switching: For control around the world

Select an IP-based KVM solution when your data center's servers require access by local and remote users. Unlike analog, IP-based KVM converts keyboard, video and mouse activity into digital signals that are routed over the IP network. Doing so makes possible several advanced features; chief among them sophisticated access control, user authentication and activity logging. By leveraging the existing

network infrastructure, IP-based KVM switches can span multiple server sites and are highly scalable. Adding an additional server requires only creating an IP address, allowing expansion on a moment's notice.

Avocent's DSR series and AutoView 1000R/2000R switches combine analog and IP connectivity in one switch. Analog connectivity provides local access at the rack and at distances up to 1,000 feet, while support for remote users or servers and unlimited distances is provided via IP.

Traditional analog KVM switches communicate with each server via a proprietary, bulky multifunction cable. Though an excellent choice for many installations, the presence of dozens, or hundreds of these cables can become unwieldy in a data center environment, resulting in considerable "cable clutter."

With IP-based KVM switching, these heavy cables are eliminated, replaced with standard CAT 5 Ethernet cabling. With the server's KVM activity routed over the existing TCP/IP network, security is greatly enhanced, providing a detailed audit trail and the convenience of secure, immediate access from anywhere in the world. For new data centers, the cost avoidance of not being required to purchase and install special cables can be significant.

With IP-based KVM technology, adding servers is as simple as connecting them to the KVM switch and assigning a network IP address. Control of IP-based serial devices becomes possible. By leveraging existing IP connections, a KVM solution can be expanded to support virtually any number of users and control an unlimited number of data center devices.

Avocent's reliable DS Series KVM switches unite the convenience of analog and power of digital device management into a single switch. Administrators can gain worldwide access and control of their servers and serial devices and can track them all from a single computer screen.

Factors to consider

Planning a KVM implementation encompasses geographical, expansion and environmental factors.

Proximity of users to the servers they manage is a primary consideration. Proximity, or distance, can mean different things to different people. Your servers may be in the same building, but, to troubleshoot, may require a long elevator trip to the basement. Your network administrator may travel frequently and require access from hundreds of miles away. Evaluate your situation.

If servers and users are within 1,000 feet of each other, analog systems, such as Avocent's AMX™ or AutoView® switches are appropriate choices. Users who require access from remote locations, or who need to manage servers in a distant data center, are best served by an Avocent KVM OVER IP™ switching system such as the DS Series of products.

Scalability, the addition of new servers and other network devices, is not only inevitable, but can sometimes sneak up without notice, perhaps through a corporate acquisition. IP-based KVM technology simplifies configuration, requiring only the addition of an IP address and updating of the authentication database. Adding servers is fast and free of complications.

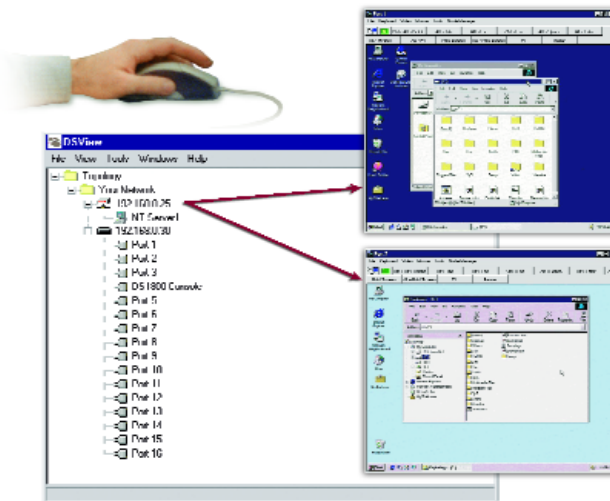
Avocent's intelligent, power-management solutions provide individual, addressable power outlets that allow authenticated users to remotely reboot devices from within the data center or around the globe. Server safety is assured through power-on sequencing that eliminates in-rush current overload. Power monitoring dynamically measures and reports current load and indicates the power status of each attached device.

Manageability

No hardware product stands alone. Every hardware product from printer or keyboard, to tape drive or server, is managed by, communicates with, or reports to software agents or applications. KVM switches are no different. Set-up, administration, access control, day-to-day operation and event tracking are handled by a variety of software tools. Avocent offers an array of advanced applications that ensure trouble-free configuration, ensure the highest levels of security, and provide users with an intuitive working environment for managing multiple servers simultaneously.

- OSCAR®, Avocent's On-Screen Configuration and Activity Reporting management tool provides point-and-click systems configuration and server selection. This intuitive, mouse-driven graphical interface enhances user productivity by surpassing competing text-based management tools capable only of keyboard recognition.
- DSView™ is the heart of Avocent KVM OVER IP™ switching. Available in client or browser versions, it is the management software through which authorized users access and manage their data center's devices. Operating over standard TCP/IP connections and incorporating SSL (Secure Socket Layer) encryption, users can manage, troubleshoot or even restart servers from their desks. For access from anywhere in the world, DSWebview provides equally secure browser-based management of virtually any data center device.
- AMWorks™ is a Java-based tool for users of the AMX family of KVM switches that require centralized system administration, the ability to create custom user profiles, and multilevel security. AMWorks also maintains an audit log of user activity and manages system wide AMX flash updates.

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



Security

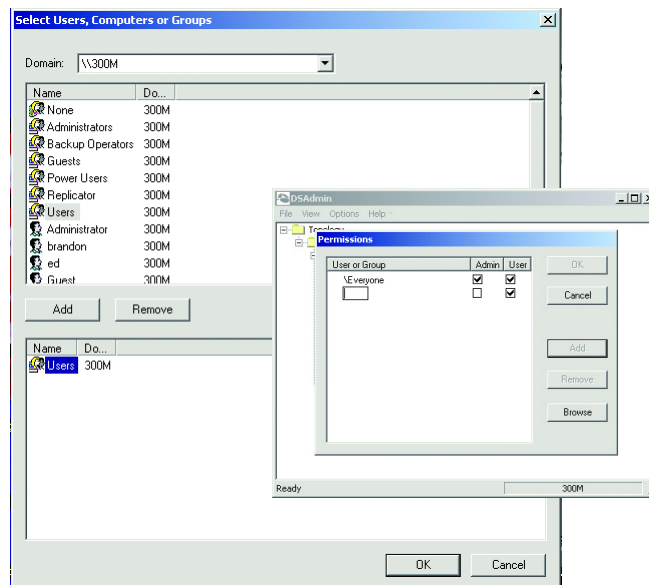
Data centers containing hundreds of servers are commonplace, and installations exceeding 1,000 servers no longer raise eyebrows. With this growth and its corresponding increase in "data density," concerns about security become paramount. A properly implemented KVM solution, while providing authorized IT technicians with the freedom to access and control network devices, must simultaneously ensure that network security is never compromised.

Every digital Avocent KVM switch employs a multifaceted security structure. Through DSAuth, logon security occurs via the IP network at two levels, combining Windows internal security with a KVM authentication process that grants users access to only those specific servers for which they are approved. To access a server or other network device, a user first starts and logs onto DSView, in either a standard Windows application or browser-based version. Verified by Windows through existing network credentials, this authorized and unique workstation/user pair connects to the DSAuth authentication database. The database returns a list of only those devices to which the user is allowed access. Devices for which the user is not authorized do not appear.

The user chooses from the list, sending an attachment request to the authentication database. If the user's rights are verified, the KVM switch is notified and communications with the server is established. This process is further secured through key exchange and must be completed within a specified time limit. In addition, the KVM switch can be configured to accept notifications from only a uniquely identified authentication database. The entire access process, and the subsequent disconnect from the server is written to an audit log file.

Security does not end with the logon process. With KVM OVER IP access, a server and its controlling keyboard, monitor, and mouse can be inches or miles apart. To prevent performance degradation and maintain session security, DSView implements data encryption and compression along the entire path. Keystroke and mouse movements are subjected to Secure Sockets Layer (SSL) encryption. Video data is highly compressed and packetized using an advanced protocol that sends only those portions of the screen image that have changed. Encryption keys expire with the termination of each KVM session, further enhancing security.

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.



Justifying the investment

To assist IT managers in measuring the overall financial benefit of a KVM solution, Avocent offers comprehensive pre-sale financial modeling. Avocent's unparalleled ROI tool uses information unique to your data center's operation to build a realistic return on investment scenario -- one that you can present with confidence to senior management.

To ensure a credible financial analysis, unquantifiable intangible benefits, such as enhanced physical security from an always-locked server room, are excluded. Reports generated through financial modeling include payback period, discounted return on investment, net present value, internal rate of return, and modified internal rate of return. Presentation-quality graphs, you can share with the decision-makers, provide detailed visual insight into both costs and benefits.

Avocent associates will assist as you identify and gather information encompassing more than 25 key aspects of daily operation. Staff headcount, salaries, IT expansion plans, and the often-overlooked time lost as engineers walk or travel from desk to server room, are all crucial components of your data center's overall operations cost. Detailed information on server quantities, their geographic locations, hardware configuration, and applications complete the picture.

Choosing the right vendor

Once cost-justification is complete, your final step is selecting the KVM provider that is best for you. For more than 20 years, Avocent has provided IT managers with secure access to and control of multiple servers and network devices. The company's innovative KVM solutions continue to be chosen by IT managers in many of the world's best-known corporations. Microsoft, Intel, Hewlett-Packard, Dell, IBM, ISS, ADP, Reuters, EMC, Aetna and Wal-Mart are among them. With thousands of installations worldwide, Avocent has the business expertise and technical resources to design a custom KVM switching solution that meets the unique needs of any corporate data center.

Avocent offers a comprehensive pre-sale financial modeling and assistance to help you identify your requirements and build a solid ROI. With proven expertise, Avocent can design a custom KVM switching solution that meets the demands of any corporate data center.



A tradition of innovation

With the explosive growth of widely dispersed corporate networks, and the corresponding increase in the size and complexity of today's IT data centers, Avocent's engineers and scientists work continuously to develop new methods of secure remote device management. The company has a long tradition of innovation that spans multiplatform switching, analog matrix switching, extension over CAT 5, patented on-screen menus, remote KVM connectivity, digital KVM OVER IP switching, and digital-to-analog integrated access to multiple servers.

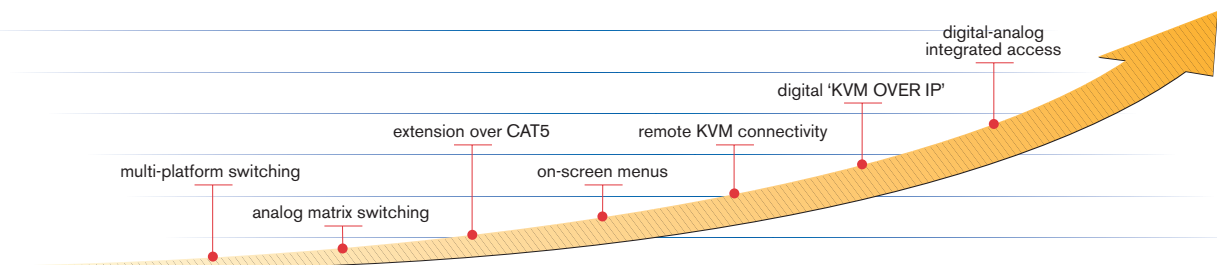
As a member of the Microsoft Partner Solutions Center, Avocent designs data center solutions that include Avocent KVM products running on Windows operating system-based platforms.

Innovation alone does not constitute a business solution. Avocent understands the importance of relationships, both before and after the sale. Through its consulting services group, the company offers pre-sale analysis, system design and installation services. On-site training classes are available for selected products.

To ensure the ongoing health of installed KVM products, Avocent offers IT managers several types of technical support. The interactive knowledge base is an extensive library of technical notes, tips and alerts. Its browser-based, multilevel, drill-down search facility minimizes time spent seeking specific information. Avocent's customer support center offers an online chat facility that allows its engineers to answer support questions in real time. Technical support is also available via telephone in the Americas, Europe and Asia Pacific. Product manuals are available online, and a wide range of extended warranties, with 24/7 telephone support, are offered.

As shown in the illustration, Avocent's history of innovation continues to grow, from multi-platform switching to digital-to-analog integrated access to multiple servers.

A HISTORY OF innovation



Product solutions

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 AMX5010 is a 16x64 analog matrix switching solution that utilizes 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 for administrators 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 multiuser, 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.

For more information about the KVM switch or network appliance that best meets your needs, contact Avocent today online at www.avocent.com, or call 1-866-286-2368 for a consultation.

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

Avocent, the Avocent logo, The Power of Being There, KVM OVER IP, AMX, AutoView, OSCAR, DSView, AMWorks, DSR, Click and Connect, AVWorks and SwitchView are trademarks or registered trademarks of Avocent Corporation or its affiliates. All other marks are the property of their respective owners. Copyright © 2003 Avocent. All rights reserved.