

## KVM/IP Switches

*Older KVM switches let you locally control all your servers from a single keyboard, monitor and mouse. The new ones based on IP let you do it from a Web browser*

It is not uncommon to find modern data centers spread across floors in a building, dispersed among buildings in the same city, or located around the world. This proliferation calls for a cost-effective solution that can provide centralized control of IT devices in the data center, without adding to the clutter.

One of the most reliable solutions to this challenge is the remote KVM (KVM/IP) switch. The KVM (keyboard, video and mouse) switch enables a single keyboard, video monitor and mouse to control more than one server at a time. These switches use (IP) Internet Protocol allowing remote access and control of the server over the Internet. So, a single KVM switch can be used to access and control a room or rack full of servers. This arrangement provides administrators with powerful BIOS-level access to the servers. Apart from this, these switches also have features like support for multiple-user access to multiple IT devices, event logging, remote power management and secure multi-layer user-access management.

There are software solutions also available for remote PC/server management. But, why do we need hardware KVM/IP solution when there are software solutions available for remote access and control of servers? While the software solutions need a PC with OS running on the server, the KVM/IP switches allow server management right from BIOS-level control. The administrator can manage the servers right from boot-up.

### Direct Hit!

**Applies to:** Data-center managers

**USP:** Understand how to remotely access and control all your servers through KVM/IP switches

**Links:** [www.einfochips.com](http://www.einfochips.com)

### Benefits of KVM/IP switches

**Worldwide, anytime access:** The remote KVM switches provide access and control of servers over IP network using just a Web browser.

**Secure access and control:** While these switches use IP for remote server management, they also support security features such as strong data encryption - SSL 128-bit RSA and 128-bit RC4 private key encryption.

**Reduce costs and clutter:** Remote KVM switches eliminate the need for connecting a keyboard, video monitor and mouse to each server. This lowers hardware costs and reduces clutter, at the same time also frees valuable physical space. It reduces demands on electrical power and heating-producing equipment.

**Hardware platform and OS-independent control:** The server farms generally have heterogeneous environment, having a variety of hardware platforms and OSs. The KVM/IP switches provide access to multiple platforms within one switching system. Since they are not dependent on hardware or OSs, these switches work in corporate IT environments having servers running on OSs such as Windows, Solaris and Unix.

**Out-of-band control:** Some KVM/IP switches also allow out-of-band access to servers. Because these switches do not rely on the organization's network, they allow the administrators to access and control servers even if the network is down. How KVM/IP switches work

They use standard TCP/IP protocols to transmit digital signals for managing the keyboard, video and mouse outputs of servers. They take advantage of the TCP/IP infrastructure already in place. Administrators can thus control servers from any location over the Internet, client PCs just need a standard Web browser, and there is no need for any special software to be installed on the client PC. This arrangement gives operators total access to the servers, as if they were in front of them:

- Analog signals from keyboard, monitor and mouse are captured and converted to digital packets
- These signals are then processed to be sent to the client over the Internet
- The processed signals are securely transmitted across existing infrastructure using TCP/IP connections to the remote client

### Close look at KVM/IP systems

The KVM/IP replicates the interfaces that the server expects to see from keyboard and mouse and also takes the video stream from the server's graphics engine. These signals from the server are processed using video processing engine in these systems. The processed video, and the keyboard and mouse signals are then transmitted over Ethernet to the

remote client. Real-time performance with good video quality/security are the major challenges these KVM/IP system designers need to handle, since these systems use the Internet.

**Real-time performance:** As these switches use IP for remote connectivity, optimum bandwidth utilization is the biggest challenge. The keyboard and mouse data are small amount of serial data to be managed; video is the most challenging component. Huge amount of data is transmitted in order to produce the quality of picture we see on the monitors. Even at a typical refresh rate of 75 MHz, there can be as much as 170 MB of digital video data transmitted each second. Even the fastest network can't support such huge amounts of data transfer over the network, especially with multiple users using the network.

To reduce the bandwidth requirements, special image processing algorithms are used in these systems. These algorithms use frame compare and image compression techniques. Some KVM/IP switches also have feature of zero bandwidth utilization when there is no change in the server video. There are different ways in which these systems are designed. The different platforms used for implementing the system are, FPGAs, RISC processors or DSP-based systems.

**Security:** In most KVM/IP switches, security features are implemented at the software level. Different encryption and decryption techniques are used. Some KVM switches implement strong data encryption -SSL 128-bit RSA and 128-bit RC4 private key encryption and also have dedicated device certificates. As these switches allow multiple user login, they also support features like secured multi-level password access.

#### **KVM/IP solutions market**

More than 25 companies worldwide offer KVM/IP solutions, and the KVM switches market is about US\$ 700 million for these solutions. The first generation KVM switches were on the analog technology and there was no concept of remote connectivity. The switch was more of a tool allowing control of multiple servers using one KVM switch. With advancements in technology, the digital KVM switches enable users remote access and control over multiple servers. The switches also give high-quality video and real-time performance.

Some major server vendors also provide remote KVM/IP-based server management as a feature for their servers. Some companies working on development of ASICs (Application Specific Integrated Circuits) having KVM functionality. No wonder, in future all the server motherboards may come with these KVM ASICs built-in to allow remote server management.

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