



Fundamentals of Enterprise KVM Solution Options

A whitepaper describing the common KVM solution types available for larger server installations in commercial and government facilities.

Keyboard/Video/Mouse (KVM) switching has come a long way over the years. The solution category has proliferated into a group of four core segments. All have a few characteristics in common. Beyond that, they diverge into well-defined groups of products with shared characteristics. This paper summarizes the most important characteristics shared by all KVM solutions; defines the difference between analog and digital products; and then provides an overview on each of the sub-categories: Matrix KVM, High-density KVM, IP-Based KVM and LCD KVM.

Table of Contents

Executive Overview	2
Table of Contents	3
Analog and Digital KVM Switches	4
Features Common to all KVM Switches	4
High-density KVM	4
Matrix KVM	5
IP-Base KVM	5
LCD KVM	5
Enabling Product Categories	6
Conclusion	6

Analog and Digital KVM Switches

KVM switches may be either analog or digital products.

Digital KVM switches convert the analog signal from the server console ports into digital signals. This makes transmitting the signals over computer networks possible, such as IP networks, which enables the user to access the KVM switch via a web browser from virtually anywhere. Digital switches are typically also known as IP-Based KVM.

Analog KVM switches will merely pass the analog KVM signal from the server to the target console via Server Interface Modules (SIMs) or dongles. Analog KVM switches may be connected to an external IP-Based device that converts the analog signal to a digital signal, to transmit that signal over IP networks.

Either of these products might fall into the categories of Matrix, High-density or LCD KVM.

Features Common to all KVM Switches

All KVM switches share a well-defined set of common attributes. These include:

1. A way to connect a keyboard, monitor and mouse to the switch through which the user accesses and controls a desired, target computer (device). The switch might support more than one console, depending on its design.
2. A way to connect target computers (or devices) to the switch. The target devices must have a connection that runs from its console ports (keyboard, video and mouse ports) to the corresponding device ports on the switch. The connection might be (a) conventional, discrete, coaxial-based cables; (b) extra-thin, three-in-one, coaxial-based cables; or (c) Cat5 cables.
3. A way for the user to select which connected target computer (or device) to access and control at any given point in time. This may be accomplished in a variety of different ways including (a) front-panel push-buttons, (b) so-called hot-key controls (keyboard combinations that select the desired port), (c) via an on-screen display (OSD) menu, or (d) via a web browser interface accessible via network connection.

High-density KVM

The candidate for this product is trying to control a fairly large number of devices from a single KVM group of KVMs. As such, cable management, the size of the cable harness, and the amount of real estate used on the back of the KVM switch all become important. High-density KVMs consolidate all three signals in a single (and relatively thin) coaxial cable or Cat5 cable for each target device.

In the case of coaxial cable, a single, space saving connector plugs into one of the device ports on the KVM while the other end connect right into the keyboard, video and mouse ports on the target device.

IN the case of Cat5 cable, a single, network-style connector (RJ45) plugs into one of the device ports on the KVM while the other end connects to the RJ45 on a “dongle” adapter, which connects in turn to the keyboard, video and mouse ports on the target device. Wintel, Sun, and Serial targets can all be connected via dedicated dongles, thereby providing cross-platform compatibility.

Compared to using conventional, coaxial keyboard, video and mouse cables; more ports can fit on the back of the KVM; the single, space saving cable per target device transmits keyboard, video, and mouse; and the cable harness is considerably smaller and more manageable. Hence, we arrive at the name, “high-density.”

High-density KVMs might also include attributes of Matrix, IP-based or LCD KVM.

Matrix KVM

The candidate for Matrix KVM has an environment with multiple administrators who need concurrent access to any of the corresponding pool of target devices. As such, each administrator must have a KVM Console (keyboard, monitor and mouse) connected to the switch. A given Matrix KVM might support 2, 3, 4, 5 or more concurrent users, while supporting 8, 16, 24, 32 or more target devices. Moreover, they can be expanded to support practically any number of target devices.

Matrix KVM switches will typically include either multiple USB or PS/2, and VGA ports for local console connection. Connection to target servers is typically made via RJ-45 connectors as described in the High Density KVM section.

Matrix KVMs might also include attributes of High-density, IP-base or LCD KVM.

IP-Base KVM

Otherwise known as Digital KVM, KVM-Over-The-Net, KVM-Over-IP. The candidate for this product will have has target devices distributed in many locations, or needs full, bios-level access to their target devices from anywhere in the world.

Example: A retail chain with servers at each store that run the POS system, security, and a variety of other functions typically has not local IT support. When a problem occurs, the Admin must sit in a car or get on a plane to address the issue. IP access to the KVM enables the Admin to solve the problem without the time and expense of travel. ROI is nearly instantaneous.

Example: A single data center with several hundred devices that include “Wintel” servers and Sun servers, as well as network switches and other RS232-controlled devices. Using a combination of IP-based produces, the admin team can access any of the servers, anytime and from anywhere, without leaving their desk.

For these devices, all connections between the target devices and the KVM are conventional coaxial or Cat5 based media. The connection for the user console is established through a standard web browser via the existing network’s IP connection.

IP-Based KVM might also include attributes of Matrix, High-density or LCD KVMs.

LCD KVM

The candidate for this product needs to locate a user console (keyboard, monitor and mouse) for the KVM in a common server cabinet or rack-mount environment such that it retracts into the cabinet. This saves a ton of space. They may have an existing KVM switch in the rack and need to add an LCD-based user console to the cabinet. They may want to take space savings to the next level and acquire an LCD drawer with a KVM already built-in, or IP-access already built in – or both!

The physical connections associated with High-Density, Matrix and IP-Based KVM are all common to LCD KVMs, depending on the model acquired.

LCD KVMs might also include attributes of Matrix, High-density or IP-based KVMs.

Enabling Product Categories

There exist also a broad array of enabling products and technologies. Examples of the more common ones include:

IP Consolidation: This is a software-based, enterprise-class, KVM management system which enables Administrators to consolidate all the target devices attached to their IP-based KVM switches under a single IP address and simplified user interface.

KVM Extenders: KVM extenders enable us to extend the distance over which the keyboard, video and mouse signals are transmitted. They come in three varieties: Coaxial cable, Cat5 and IP. Coaxial relies in high-quality, heavily shielded cables to maintain signal integrity over long distances. Cat5 converts the KVM signals into something that transmits well via Cat5 wire over long distances, then converts it back to KVM signals at the other end. IP, of course, digitizes the KVM signals for transmission one's network or the internets from access from virtually anywhere.

Power: These products might stand alone or work in conjunction with a KVM switch. In either event, they enable their user to control whether power is being delivered to a given device. They can even effect a controlled device (server) shut down in many cases.

Serial: Similar in function and utility to the above mentioned KVM switches and supporting products but used for serial/RS232-controlled devices. Examples include network switches, UPSs, etc.

Convertors: Typically, these are used for making cross-platform connections possible (like Sun, Serial or USB) to a PS/2 PC-oriented KVM switch. Note that the term "convertors" generally connotes a device that actively changes the nature or character of the signals in question. In contrast, an "adapter" merely re-arranges the pin-out or shape of the connector.

Conclusion

Fundamentally, KVM switching is very strait-forward; very simple. The "devil," as they say, "is in the details." Very rarely is a single product category sufficient for a typical enterprise solution. In fact, quite the opposite is true –enterprise solutions (and many SMB solutions) are usually defined with two or more of these categories working together like building blocks.

ATEN has optimized its product offering to create "Small Enterprise" and SMB solutions. These are areas typically overlooked by KVM manufacturers who are lured by the glamour of selling to "Large Enterprise" customers. ATEN knows that SMB and Small Enterprise is where most of America's work gets done. To optimize its solutions for these environments, ATEN makes it products easier to learn, use and maintain; while making minimizing deployment time, learning curve and total cost of ownership (TCO). For more information on KVM in general or on ATEN's products, contact the experts at ATEN, www.aten-usa.com.

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