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hp IP consoling solution

**technical
white paper**

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introduction

Information technology (IT) has provided businesses with many advantages, including making customer interaction more convenient, providing faster time to market, and promoting ease of information communication within companies. Unfortunately, this technology is not without its consequences. The price of entry into the global digital economy includes the purchase and management of very sophisticated network infrastructures with supporting information technology equipment, often including servers, switches, routers, firewalls, and load balancers—all requiring extensive monitoring and control. A technical team's ability to manage network infrastructures is contingent on immediate, hands-on access to the servers.

The better, and more appropriate, a console or Keyboard, Video, and Mouse (KVM) solution is for a given company's environment and productivity goals, the more successful that company will be at maintaining high levels of service with the smallest possible team of IT staff. KVM solutions vary greatly in their attributes and capabilities. These variations include distance limitations, cabling requirements, server capacity, and platform support and security. All of these variables affect the ability of network administrators to troubleshoot and remedy problems when they arise, as well as their ability to prevent problems through proactive maintenance.

This white paper identifies the specific problems inherent in maintaining the type of data center infrastructure present in medium to large data centers and explains how these problems affect the performance of IT staff and result in increased cost for the company. The HP IP Consoling Solution helps mitigate many of the issues that plague data center technicians. Its design and compatibility make it the ideal solution for maximizing rack space while still providing superior server accessibility, allowing a growing company to add the number of servers that it needs to do business and providing remote access to servers.

executive summary

For a growing company to have the network resources it needs to remain competitive in today's market, IT staff must devote considerable time and effort to maintaining a complicated and expanding network infrastructure. The HP IP Consoling Solution offers many advantages over currently used KVM management technology.

Using the HP IP Consoling Solution, IT technicians can manage their network infrastructures from remote workstations through standard TCP/IP connections. The IP Console Switch has more ports than previous switches, supporting up to 128 servers through tiered switches or by use of an Expansion Module, which accommodates eight servers and can be mounted on rack rails to save U-space. Interface Adapters, which convert standard PS2 keyboard, video, and mouse connections to an RJ-45 connection, allow the use of UTP CAT5 cables to connect servers to switches. An easy to use Java application allows convenient access to attached servers from any Windows or Linux workstation on the network.

summary

The HP IP Consoling Solution addresses many of the problems inherent in managing a medium to large network infrastructure spread out over a large geographic area. The legacy Compaq KVM switch, while allowing adequate management capabilities for smaller networks, is limited in its ability to provide necessary functionality in larger data centers.

The IP Consoling Solution provides better cable management by using Interface Adapters. These adapters convert the PS2 server connections into RJ-45 connections, which connect to the switch by a simple UTP CAT5 cable. This convenient feature allows the much smaller CAT5 cables to be easily routed through cable guides and eliminates the tangles and confusion that occur with large, bulky cables and coiling at the rear of the server racks.

The IP Console Switch has 16 ports, more than currently used switches, as well as Expansion Modules, which accommodate 8 additional servers and can be mounted on rack rails. The combination of a greater number of ports and the Expansion Modules allows the IP Console Switch to support 128 servers. These attached servers can be accessed remotely through TCP/IP connections from any Windows or Linux workstation on the network.

The IP Console Viewer, an easy-to-use Java application, allows IT staff to perform the same functions that they could if they were directly in front of the switch console, such as managing the console switch, launching a video session, organizing switches and servers, and performing routine maintenance.

The HP IP Consoling Solution is more efficient than traditional solutions, such as remote control access, which is limited by its dependency on software that runs on a managed device and gives no access to the booting process. Another past solution—analog KVM switching—requires dedicated cabling, limits the distance between user workstations and managed devices, and limits the number of users who can access a server. With its cable management advantages, IP access, and increased server capacity, the IP Consoling Solution surpasses analog switching.

KVM issues in large data centers

The logistics of maintaining the ever-increasing array of IT equipment needed to support the infrastructure of a growing company can be very complicated and can hinder the performance of IT staff. Attaching multiple servers to one console switch requires the use of traditional KVM cabling, which is bulky and cumbersome. To switch between servers, IT personnel must be physically present in the data center location—a cold, noisy, and generally unpleasant work environment. Current switch consoles only hold up to eight servers, and additional console switches must be used to add more servers to the configuration, increasing costs and taking up valuable rack space.

previous solutions and limitations

One of the past attempts to solve the problems experienced by growing data centers is the legacy Compaq switch. This KVM switch allows for up to two local users and connectivity of up to 64 servers through tiering, but it retains many of the issues that are now solved with the use of the IP Consoling Solution. table 1 compares the features of the HP IP Consoling Solution and the legacy Compaq switch.

While the legacy Compaq switch provides adequate functionality for a small or medium data center, it has limitations that increase with growing server density. The legacy Compaq switch has half the number of ports that the HP IP Console Switch provides, and as a result can only support half the number of servers. The legacy Compaq switch does not provide remote IP access, requiring the IT administrator to be at a local rack-mounted console in order to access the servers and perform necessary maintenance. In addition, the legacy Compaq switch still requires the bulky, traditional KVM cabling that the IP Consoling Solution's Interface Adapters render obsolete. Clearly, the HP IP Consoling Solution improves functionality and provides greater flexibility than the legacy Compaq switch.

table 1. Model specifications comparison

	hp IP Consoling Solution	legacy Compaq KVM switch
number of server ports	16	8
maximum number of supported servers	128	64
LAN/WAN access	yes (1 or 3 users)	no
number of simultaneous users	2 or 4	1 or 2
improved cable management	yes (UTP CAT5)	no (standard KVM cables)
SNMP—traps can be sent to Insight Manager/OpenView	yes	no
support for multiple languages (English, French, Italian, German, Spanish, Dutch, and Japanese)	yes	yes
support for different device brands	yes	yes
support for variety of operating systems	yes	yes
mounts behind keyboard (0U)	yes	yes

hp IP Consoling Solution

While KVM consoling offers substantial business value, conventional KVM technologies present some significant operational limitations. These limitations prevent technical teams from fully realizing their potential productivity—resulting in less-than-optimal IT service levels and higher management costs. The IP Consoling Solution, by comparison, removes these limitations.

The HP IP Consoling Solution combines analog and digital technology to provide flexible, centralized KVM control of data center servers. This solution provides enterprise customers with a significant reduction in cable volume, secure remote access, and high-performance server KVM access.

benefits of IP Consoling Solution

The HP IP Consoling Solution has three main features that distinguish it from previous KVM solutions: it facilitates cable management, it supports a greater number of servers and simultaneous users than previous KVM switch devices, and it enables network administrators to easily access any connected device regardless of location over standard TCP/IP (Ethernet) network connections.

figure 1. hp IP Consoling Switch, Expansion Module, and Interface Adapter

cable manageability

In a typical network infrastructure, servers are commonly connected to the KVM switch by standard KVM cables, which have a separate connector for each keyboard, video, and mouse port. These cables create large, cumbersome bundles that are difficult to route through the rack, can be easily tangled, and take up a significant amount of rack space.

The HP IP Consoling Solution uses an Interface Adapter to eliminate the need for large KVM cables. The standard KVM connectors of the Interface Adapter operate with any HP or third-party server that has standard PS2 keyboard, video, and mouse connectors. This Interface Adapter transitions the standard PS2 connections to an RJ-45 connection.

The end of the Adapter is connected to the switch console port by a UTP CAT5 cable. The CAT5 cable is much thinner and more flexible than the normal KVM cables, and more of them can be easily routed through the cable guides on the sides of the server racks to keep them from hindering airflow and access to equipment.

In addition, the lengths of the CAT5 cables can be customized to eliminate cable coiling in the rear of the server rack. This significantly reduces the time that IT administrators must spend in rack cabling efforts, allowing them to devote more time to more important areas of IT management.
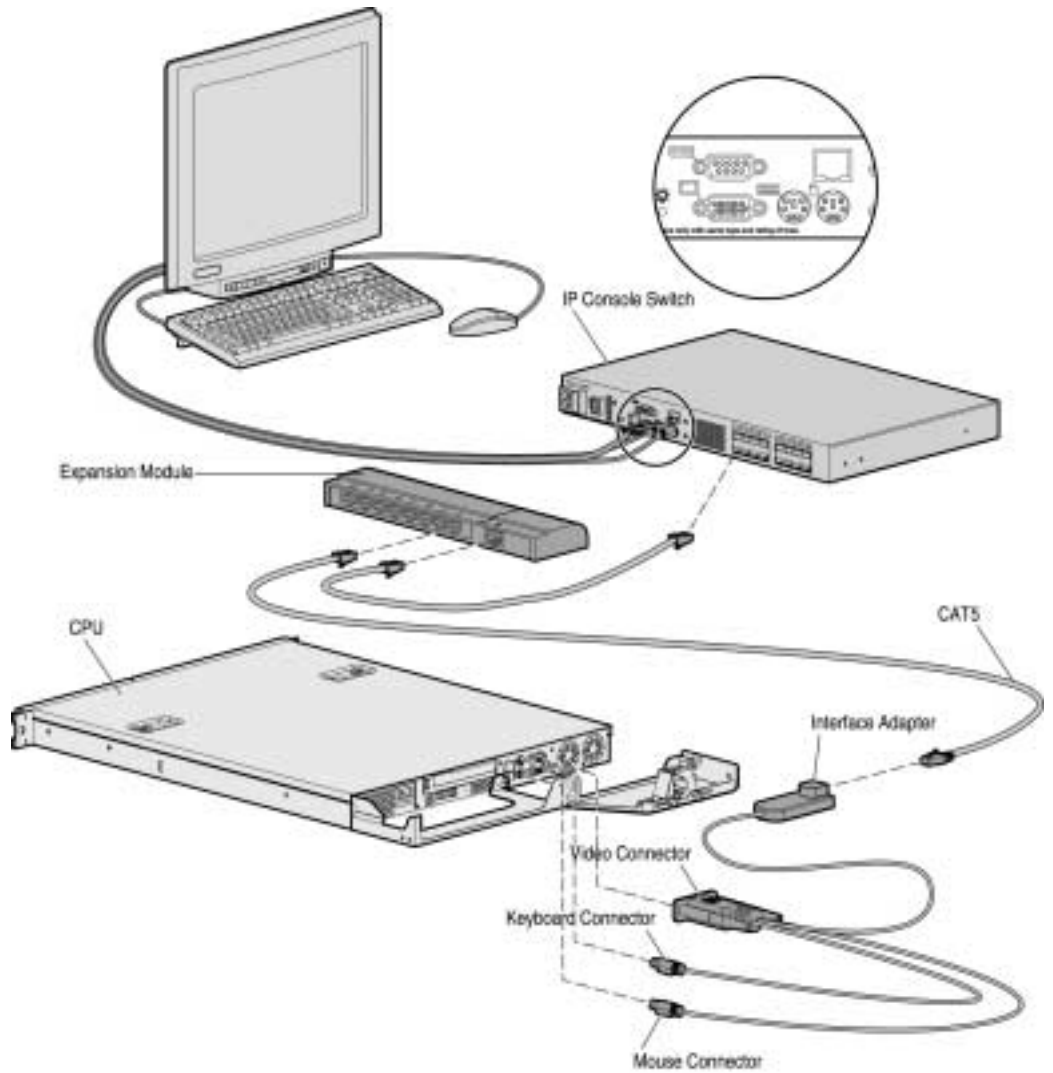

figure 2. Example of IP Consoling Switch configuration

increased server capacity

The HP IP Consoling Solution provides greater server capacity. While legacy HP KVM switches have a maximum of eight ports and can support up to 64 tiered servers, the IP Consoling Switch has 16 ports, which can accommodate a combination of directly attached servers or tiered servers using Expansion Modules. The IP Consoling Expansion Module is an optional device that allows the addition of eight servers per switch port.

Adding additional servers by means of the expansion module takes up much less rack space than tiering traditional switches because the expansion module is much smaller and can be mounted on the rack rails to conserve valuable U-space.

The IP Consoling Switch is also backward compatible with the legacy Compaq switch, which can be tiered to the IP Consoling Switch using an Interface Adapter. With the use of the Expansion Modules or legacy Compaq switches, the IP Console Switch can support up to 128 servers.
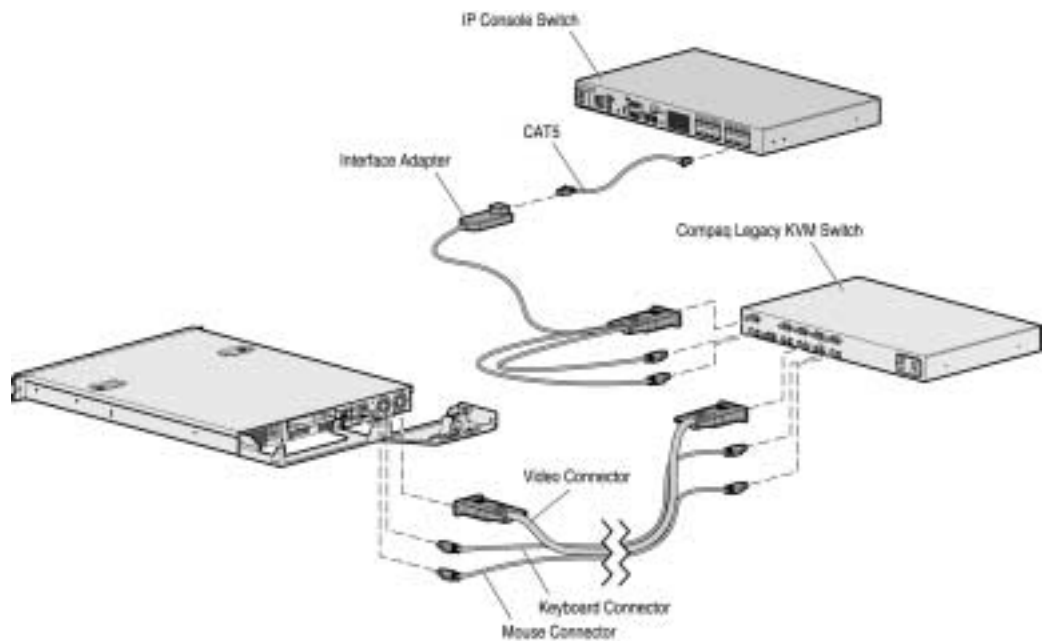

figure 3. Example of the IP Consoling Solution with tiering

IP access

The HP IP Console Switch also provides the IT administrator with network access to local KVM functionality through standard TCP/IP connections. These connections can either be in-band (using the same network as a company uses for its enterprise applications) or out-of-band (using dedicated cabling). Either way, the IP Consoling Solution gives network administrators the unrestricted "virtual presence" that is so essential to efficient network device management and troubleshooting.

The IP Console Switch provides this functionality by digitizing the analog signals that support the KVM operation of attached servers and then sending those digital signals as packets over an IP network connection. Because IP is the universal networking standard for enterprise networks, private carrier WANs, and the Internet itself, IP Consoling Solution signals can be sent from anywhere to anywhere. Therefore, whether a network administrator is down the hall or across the globe, the IP Consoling Solution provides immediate, hands-on access to any server or network device.

By providing remote access, the IP Consoling Solution allows companies to move IT staff away from the physically unpleasant work environment of the data center, increasing employee satisfaction and productivity. This remote access also eliminates the need for a physical presence in the data center location to access the servers, thus allowing a smaller IT team to provide the same IT services for the company.

software functionality

The IP Console Viewer is a Java application that provides network access to attached servers for Windows and Linux workstations on the network. An Explorer-like interface with an intuitive split screen provides the user with a single point of access for the entire system.

From the IP Console Viewer, the user can easily perform tasks such as managing a console switch or launching a video session. Customizable groupings, such as site and location, provide an easy method of organizing servers and switches. Users can also create custom folders to store shortcuts to frequently accessed servers and perform routine maintenance on the switch and interface adapter firmware.

The viewer also provides access to secure switch-based authentication and user name/password storage. There are two levels of user access—Administrator and User—which can be used to configure device-specific access.

comparing IP Consoling Solution and other KVM solutions

The HP IP Consoling Solution is a powerful tool for enabling finite technical teams to manage a very large number of devices spread over a large geographic area. Although the IP Consoling Solution is currently the most efficient solution for managing local server access over this type of network infrastructure, several other types of KVM management solutions are available. Two other common approaches to remote device management are remote control and analog KVM switching. When selecting a KVM solution, it is important to be aware of the limitations of each of these alternatives.

remote control access

Many organizations rely heavily on remote control software to enable their network administrators to manage servers from a distance. Such software-only strategies, however, are fraught with problems.

Remote control applications are entirely dependent on software that runs on the managed device. If the device experiences a problem, there is a risk that the remote control software also will not function properly. For this reason, remote control software typically fails when it is most needed.

Additionally, remote control software running on a managed server requires that the operating system (OS) of the server is fully booted and running. However, there are many cases where a network administrator wants to monitor, control, and perhaps even interrupt the boot process as it unfolds. This cannot be done with OS-dependent remote control software.

With the IP Consoling Solution—and KVM consoling in general—the boot process can be managed in the same manner as if the network administrator were sitting in front of the managed device. After making necessary changes to the configuration of the device, the network administrator can restart and monitor the entire process as the device reboots. Remote control tools cannot offer this essential functionality.

Device-resident software components present other problems as well. They consume limited processor cycles, undermining the performance of critical systems. They add complexity to managed systems, increasing the chance of deleterious software conflicts. The IP Consoling Solution is a much more organized and far more effective solution for managing remote devices than software-based tools.

Managing and updating software components also add to the workloads of technical teams already overburdened with software distribution and administration tasks. Software must also support the underlying operating system (DOS, Windows, Linux, NetWare, and so on) of the managed server and can be problematic for companies using a wide range of server types. KVM does not have this OS dependency.

conventional analog KVM switching

Before the introduction of the digital IP Consoling Solution, analog switches were the standard means of providing KVM functionality. This type of switching was widely adopted by organizations seeking to more efficiently manage their growing IT infrastructure while minimizing the number of keyboard, video, and mouse consoles needed to access servers.

Analog KVM works by switching analog keyboard, video, and mouse signals over dedicated cabling, enabling one or two consoles to access multiple servers. Each managed device is attached to a specific switch port, and each authorized user is attached to a specific access port.

This hard-wired switching approach leads to several limitations, including:
- Limited maximum distances between users and managed devices
- Limited number of users due to "blocking matrix" switch architectures
- One-to-one, dedicated cable connections between KVM switch ports and managed devices—thereby limiting the scalability of switches and creating burdensome cable bulk and cable management

These limitations prevent organizations from giving administrators direct access to every appropriate resource from everywhere those administrators may have to work at any given time. They limit the organization's ability to achieve optimum service levels and to maximize the productivity of technical teams. These conventional solutions can also generate significant cable management issues.

Because the HP IP Consoling Solution allows network workstations to access servers, it eliminates distance limitations between servers and users. IP networking technology allows a single cable to support multiple servers in a stacked configuration, enabling virtually unlimited scalability. Multiple users can connect to the IP Console Switch, allowing simultaneous access to the servers directly attached to the switch.

The HP IP Consoling Solution delivers flexibility, scalability, and reach that conventional analog KVM switches cannot come close to matching. By overcoming these inherent limitations, the IP Consoling Solution delivers unique operational efficiencies invaluable to today's network infrastructures.

comparing the IP Consoling Solution and remote KVM switch control

Some KVM switching manufacturers mimic a true IP Consoling Solution architecture by enabling remote control of a conventional analog KVM switch. That is, they provide IP based access to a KVM switch that connects to managed devices using conventional analog links.

Such systems do provide some of the benefits of the HP IP Consoling Solution. Users can be located anywhere and can connect to the KVM switch by means of existing private or public network connections. However, such architectures present the same limitations as any other analog system when it comes to connecting to managed devices. These systems can require an extensive cable plant and do not scale efficiently to support large numbers of network devices in the least amount of rack space.

Network administrators should exercise caution in selecting an IP Consoling Solution and make sure that the benefits of IP connectivity extend through both sides of the remote management equation.

operating systems and compatibility

The IP console switch connects to any type of server that has a standard PS2 keyboard, video, and mouse connection. Because there is no additional software to install on servers, the HP IP Consoling Solution can be used to control HP and third-party servers in any of the following operating environments:
- Windows
- Linux
- Tru64
- NetWare
- Unix

Using the IP console viewer, users can access local KVM functions from any Windows or Linux workstation by means of a 10/100 network connection. Each switch can accommodate 16 directly attached servers with no user blocking.

Up to eight servers may be tiered or cascaded on each switch port using either a legacy Compaq KVM switch or an Expansion Module; however, only one user can access tiered switches or servers connected by Expansion Modules at any one time. Critical devices requiring frequent access should be attached directly to the switch port.

Each server or legacy Compaq switch requires an Interface Adapter to transition the standard PS2 connections to RJ-45. Interface Adapters can be connected to the switch port with any UPT CAT5 cabling.

The HP IP Consoling Solution is not compatible with the Compaq PCI KVM Switch or legacy HP console switches.

for more information

For more information regarding this product visit the HP website at www.compaq.com/products/servers/proliantstorage/rack-options/scs.