Evaluating Hardware-based Keyboard-Video-Mouse (KVM) Remote Control

Hardware-based KVM Remote Control has the potential to simplify Service Desk technicians' jobs and reduce Service Desk cost.

Executive Overview

Intel IT is currently developing a series of use cases that take advantage of Keyboard-Video-Mouse (KVM) Remote Control, a hardware-based feature of PCs with 2010 Intel® Core™ vPro™ processors and Intel® HD Graphics. We anticipate these new use cases will significantly reduce the time Intel IT Service Desk technicians spend solving some of the common PC issues Intel employees face every day, thereby reducing support cost and improving employee productivity.

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Unlike software-based KVM solutions, 2010 Intel Core vPro processors can give our Service Desk technicians full control of users' computers along with the ability to see what is on the monitor—even if the OS crashes. 2010 Intel Core vPro processors enable Service Desk technicians to perform many tasks remotely:

- **Interact with the BIOS during reboot.** With KVM Remote Control, Service Desk technicians can see the graphical user interface-based version of the BIOS and can seamlessly boot from BIOS to OS without switching consoles.

- **Reset passphrases when employees forget them.** About 60 percent of our Service Desk calls related to encryption are due to forgotten passphrases. Without KVM Remote Control, password resets can take 25 to 40 minutes; we estimate that this type of call would take only about three minutes to resolve using KVM Remote Control.

- **Remotely execute a standard IT client build.** Because it supports remote full-screen video, KVM Remote Control enables remote standard builds—something that was not possible prior to 2010 Intel Core vPro

processors. This new capability means users without local support no longer need to send their PCs to an Intel IT service center and can return to productive work much faster.

- **Repair network adaptor issues and damaged or deleted system files.** Typically, talking non-expert users through a system or network adaptor repair over the phone can take more than half an hour. With KVM Remote Control, Service Desk technicians can take remote control of users' PCs and fix the issue far more efficiently.

- **Launch and use full-screen diagnostic tools.** Prior to 2010 Intel Core vPro processors with KVM Remote Control, Service Desk technicians were limited to text-based remote diagnostic tools that didn't offer the depth and breadth of recovery options available with full-screen tools.

Hardware-based KVM Remote Control has the potential to simplify Service Desk technicians' jobs and reduce Service Desk cost. Laptops based on 2010 Intel Core vPro processors could enable Intel employees to spend far less time dealing with PC issues and more time producing value for the enterprise.

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IT@INTEL

IT@Intel is a resource that enables IT professionals, managers, and executives to engage with peers in the Intel IT organization—and with thousands of other industry IT leaders—so you can gain insights into the tools, methods, strategies, and best practices that are proving most successful in addressing today's tough IT challenges. Visit us today at www.intel.com/IT or contact your local Intel representative if you'd like to learn more.

BACKGROUND

Intel's worldwide computing environment includes more than 100,000 PCs. To increase our ability to maintain, manage, and protect these PCs while driving down management costs, Intel IT is undertaking a multi-year program to implement Intel® vPro™ technology throughout our environment. By the end of 2009, we had deployed and provisioned about 50,000 PCs with Intel vPro technology.

Intel vPro technology consists of hardware-assisted security and manageability capabilities that enhance Service Desk technicians' ability to maintain, manage, and protect laptops—even if the PC is shut down or the OS is unresponsive.

Evolution of Intel® vPro™ Technology

Intel vPro technology has transformed the efficiency and cost-effectiveness of Intel IT's PC diagnostic and repair services. Each new version of Intel vPro technology, which includes Intel® Active Management Technology (Intel® AMT), introduces features that add to its usefulness. For example, the first version of Intel vPro technology in 2006 only worked within the corporate firewall. In 2008, the introduction of Fast Call For Help extended IT support to unresponsive laptops outside the corporate firewall. Current PCs are poised to take advantage of the many new

features of 2010 Intel® Core™ vPro™ processors, including Keyboard-Video-Mouse (KVM) Remote Control.

Intel IT is committed to evaluating emerging technology and deploying advantageous features during our standard two- to four-year PC refresh cadence. Because we do not refresh all laptop PCs at once, there will be a period where we have a mixed environment; some PCs will have 2010 Intel Core vPro processors with KVM Remote Control and some will have previous generations of Intel® Core™ processors with Intel® vPro™ technology.

KVM Remote Control Overview

2010 Intel Core vPro processors with KVM Remote Control have the potential to reduce the frequency with which users must bring their PCs into a service center as well as the frequency with which Service Desk technicians are required to make expensive, time-consuming desk-side visits.

With KVM Remote Control, Service Desk technicians are no longer limited to text-based representations of users' PC screens. They can view PC graphical user interfaces (GUIs) remotely, including on-screen error messages. This allows Service Desk technicians to repair systems directly rather than talking users through a diagnostic process over the phone—which can be particularly difficult when language barriers such as accents or dialects are present.

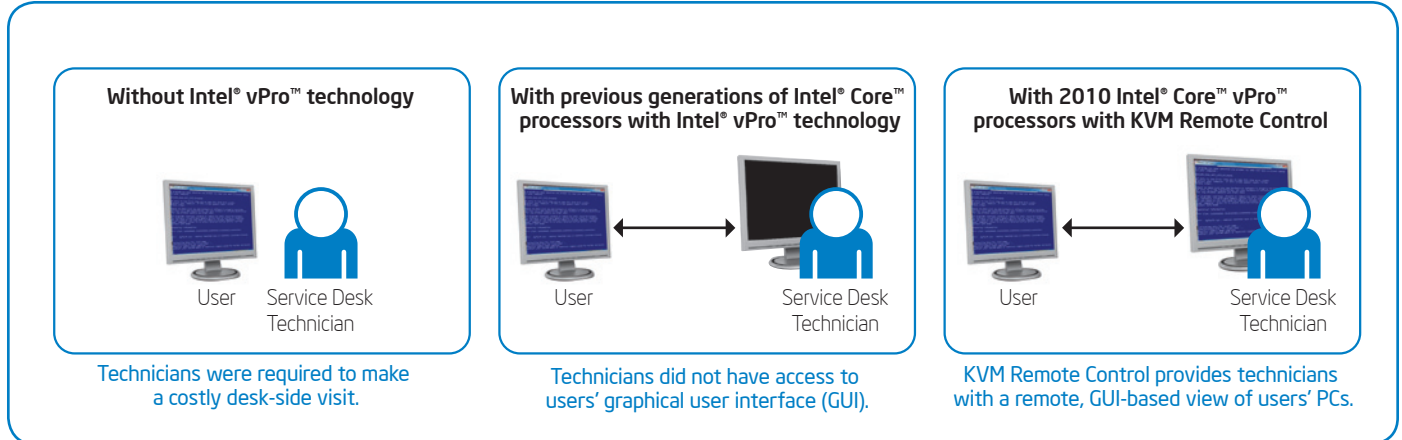Unlike software-based KVM solutions, hardware-based KVM Remote Control is

Without Intel® vPro™ technology	**With previous generations of Intel® Core™ processors with Intel® vPro™ technology**	**With 2010 Intel® Core™ vPro™ processors with KVM Remote Control**
User Service Desk Technician	User Service Desk Technician	User Service Desk Technician
Technicians were required to make a costly desk-side visit.	Technicians did not have access to users' graphical user interface (GUI).	KVM Remote Control provides technicians with a remote, GUI-based view of users' PCs.

Figure 1. 2010 Intel® Core™ vPro™ processors with Keyboard-Video-Mouse (KVM) Remote Control can make solving "blue screen" problems easier and faster.

not limited to situations where the OS is working. 2010 Intel Core vPro processors with KVM Remote Control enables Service Desk technicians to diagnose and repair PCs even when the OS is non-functional—a situation that accounts for a significant number of Service Desk calls.

For example, more than 5,000 employees called the Service Desk in the first quarter of 2010 because their computers would not boot. Of those, 50 required rebuilds due to insufficient tools to assist remotely. With KVM Remote Control, Service Desk technicians could have fixed these problems more efficiently because they would have had total control of the computers, even if the OS couldn't boot. Although this may seem like a small percentage, the actual cost to rebuild, including user downtime, is significant.

Recognizing the potential value of KVM Remote Control, we worked with the Intel® IT Innovation Centre to define and evaluate KVM Remote Control use cases for our Service Desk.

SOLUTION

Intel IT and the Intel IT Innovation Centre in Folsom, California, received pre-production, non-OEM systems based on 2010 Intel Core vPro processors. Engineers immediately started experimenting and testing KVM Remote Control, and in less than a week, they had written an application that allowed everyone in the Innovation Centre to use the capability.

During our evaluation of KVM Remote Control, we tested two different scenarios:

- Running our own Intel IT-developed system.
- Running a third-party, integrated viewer.

In the lab, Intel IT is using the KVM Application provided to users within the Intel developed software development kit (SDK).

Use Cases

Intel IT and the Folsom Intel IT Innovation Centre have identified at least six situations in which 2010 Intel Core vPro processors with KVM Remote Control could offer significant benefits to Intel IT operations and end-user productivity. The team is continuing to develop and test additional potential use cases.

Intel® IT Innovation Centres

To fulfill its mission of providing strategic IT leadership and services, in 2003 Intel IT formed a team to develop innovative solutions and improve innovation capabilities within the IT organization and across Intel.

At the heart of these activities is the network of Intel® IT Innovation Centres. The centres catalyze worldwide IT innovation and accelerate Intel's competitive advantage and industry leadership through systemic innovation and breakthrough research, solutions, and practices.

By the end of 2006, we had established 12 centres, including four in the United States and one each in China, Dubai, India, Ireland, Israel, Malaysia, Russia, and Turkey. Innovators at the centres collaborate with Intel business units, governments, and industry.

USER EXPERIENCES A "BLUE SCREEN"

Also known as an OS stop error, a "blue screen" is the error message the OS displays after encountering a critical system error, presenting information for diagnostic purposes. The system may also dump all of its memory into a text file, and accessing this file requires an expert Service Desk technician. Blue screens stem from numerous causes: problematic device drivers and registry keys, malfunctioning hardware, incompatible dynamic-link library (DLL) files, faulty memory or power supplies, or overheating of computer components.

As shown in Figure 1, prior to the introduction of Intel vPro technology, a blue screen required a desk-side visit from a Service Desk technician to ascertain the cause of the problem and then fix it. With previous generations of Intel Core processors with Intel vPro technology, a user could call the Service Desk; however, Service Desk technicians couldn't see the GUI after the initial OS splash screen. The user would have to describe what was displayed on the screen, and it could sometimes take up to 40 minutes or more to resolve the issue.

2010 Intel Core vPro processors with KVM Remote Control enable Service Desk technicians to see a user's blue screen as if they were sitting at the PC. To resolve the problem, Service Desk technicians can boot the PC, experience the error, launch a tool that analyzes the blue screen data, and then guide the OS to fix the error.

We anticipate that the new KVM Remote Control capability could significantly reduce the resolution time for calls related to blue screens.

USER FORGETS A PASSPHRASE

Of the encryption-related calls the Service Desk receives, about sixty percent are due to forgotten passphrases. Passphrase resets can take from 25 to 40 minutes to resolve, and they are especially difficult if language barriers are present.

Prior to 2010 Intel Core vPro processors with KVM Remote Control, Service Desk technicians couldn't watch the entire reboot process or enter a passphrase for callers. Instead, Service Desk technicians had to dictate the passphrase, which is a memorable multi-word phrase (such as a

sentence) with spaces between words, over the phone. With KVM Remote Control, Service Desk technicians can reboot a system using the normal OS and enter the passphrase for the employee.

In addition, Intel IT engineers had to work with the encryption supplier to create a special software application that could recover the passphrase, which restricted our ability to change solutions or suppliers easily. Service Desk technicians then had to use serial over LAN (SOL) and integrated drive electronics redirect (IDE-R) consoles to run the ISO image—the contents of a CD packaged into a software solution—which was time-consuming and cumbersome.

Unlike the SOL/IDE-R approach, KVM Remote Control does not require a special encryption ISO image; therefore, we do not need to develop a special passphrase recovery application. This could save IT engineering development time and also provide the freedom to use different encryption solutions and suppliers.

We estimate that resolving passphrase issues will generally take three minutes or so using KVM Remote Control—about ten times faster

With previous generations of Intel® Core™ processors with Intel® vPro™ technology
Technicians see a text-based translation of the BIOS screen.
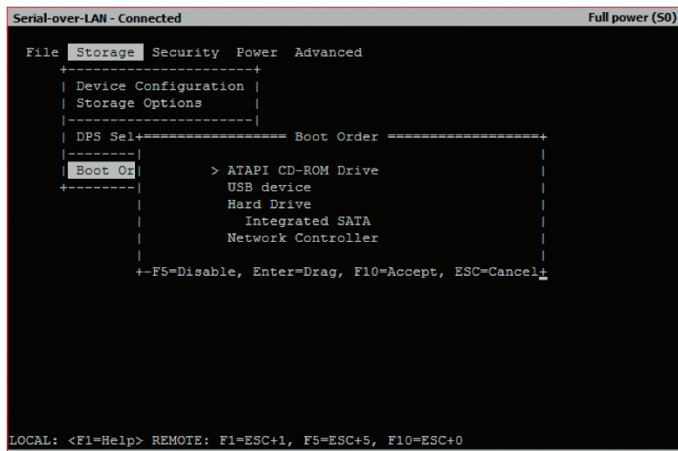
With 2010 Intel® Core™ vPro™ processors with KVM Remote Control
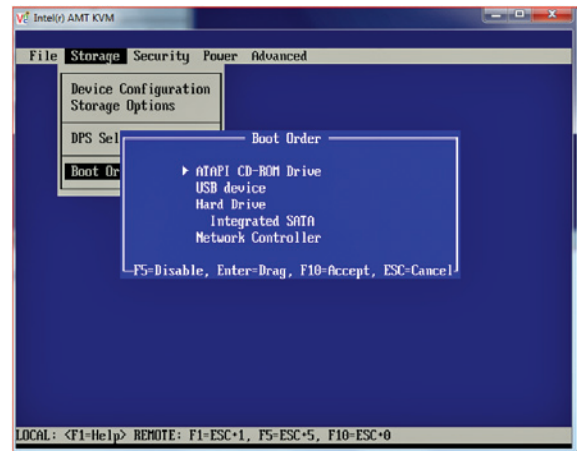Technicians have a remote, graphical user interface-based view of the entire boot process.

Figure 2. Keyboard-Video-Mouse (KVM) Remote Control enables Service Desk technicians to see the entire boot process as it appears on a user's screen.

USER NEEDS A NEW CLIENT BUILD

Providing new client builds to users in locations without local IT support has always been problematic. The GUI phase of the build process requires user interaction, which is not possible using a SOL/IDE-R session. It is possible to modify the standard IT build to eliminate the GUI phase and use a text file to provide input instead of user interaction; however, this is not an acceptable practice at Intel, as we do not modify standard builds.

Because of this, in the past users would have to send their PCs to an Intel IT service center. Alternatively, users could find another machine, burn a boot CD, and talk through the build process with the Service Desk—however, most users do not possess the IT knowledge to accomplish this task efficiently.

2010 Intel Core vPro processors with KVM Remote Control allow Service Desk technicians to remotely reboot a system to a pre-installation environment and remotely control the PC during the GUI phase of the build to complete the process. Engineering development is not required, and the user doesn't have to walk or ship the PC to a service center.

USER HAS NETWORK ADAPTOR OR NETWORK DRIVER PROBLEMS

It is fairly common for users to experience problems with network adaptors or Network Driver Interface Specification (NDIS) settings. For example, users might accidentally modify the network adaptor settings or install a bad driver. Third-party applications, such as antivirus software,

can also cause these sorts of problems, isolating systems by disabling the NDIS driver network access. In these situations, the network adaptor is still working at a hardware level, but the OS and software applications cannot connect to the network.

With previous generations of Intel Core processors with Intel vPro technology, Service Desk technicians could look at files on a PC by booting to an ISO image with SOL/IDE-R, but couldn't actually see what was happening on the PC's screen or access the OS—inevitably leading to a desk-side visit.

Because KVM Remote Control accesses the network adaptor at a hardware level, Service Desk technicians can repair a system that has configuration issues with the network adaptor and can also run the OS. Potential time savings per call varies with different

scenarios, but without KVM Remote Control the only alternative is for users to bring their PCs to a service center or for technicians to make a desk-side visit.

PC HAS MISSING SYSTEM FILE OR DAMAGED HARD-DRIVE PARTITION

Service Desk technicians often need to replace a missing or damaged file on users' PCs. For example, a software application may have quarantined or deleted a necessary system file, or a hard-drive partition may have become damaged.

We could address this problem without KVM Remote Control by using an internally developed, open-source CD image called Remote Drive Share (RDS), which uses SOL/IDE-R to map to a share drive. The RDS script mounts the PC on a share drive so that a Service Desk technician can see all of the file contents and then replace files and file systems, and eradicate spyware.

The advantage of using KVM Remote Control in this situation is that it would enable Service Desk technicians to use RDS to download and launch GUI-based diagnostic and recovery tools that require the use of full-screen video and a mouse. These types of tools significantly reduce the time it takes a Service Desk technician to fix the problem.

SERVICE DESK TECHNICIAN WANTS TO SEE THE EFFECT OF BIOS CHANGES

When repairing a PC, a Service Desk technician commonly makes a change in the BIOS, such as eliminating a hard drive lock password, and then wants to boot the OS to see the effect of the change. Without Intel vPro technology, this scenario required that a technician make a desk-side visit or that the user bring or send the PC to a service center and wait for a replacement.

Prior to 2010 Intel Core vPro processors with KVM Remote Control, Service Desk technicians had to use a SOL console to boot to BIOS and then switch to a separate IDE-R console to boot the OS. KVM Remote Control makes this process more efficient: Service Desk technicians can seamlessly watch the system boot from the splash screen to the OS, or from out-of-band to in-band, using a single console, shown in Figure 2.

Additionally, Service Desk technicians used to see a text-based conversion of the graphic BIOS screens, which was adequate but not as useful as seeing the GUI. When parts of the boot process are invisible, Service Desk technicians must rely on users to describe what is occurring onscreen and then must instruct users as to which keys to press and when to press them. When miscommunication occurs, the technician has to restart the entire process.

In stark contrast to this inefficient and error-prone approach, KVM Remote Control enables the Service Desk technician to see the entire boot process as it appears on the user's screen and interact with the boot process remotely using a mouse.

Results

Our evaluation indicates that KVM Remote Control has the potential to simplify Service Desk technicians' jobs. Because technicians can see what the user is seeing, just as if they were sitting in front of the PC, they will be able to diagnose and repair a PC with no user intervention or involvement and without desk-side visits.

We anticipate this will allow us to reduce the time and cost associated with resolving many IT service issues. In fact, for certain scenarios, we estimate KVM Remote Control will enable a 10x faster Service Desk response time and a 10x quicker return to productivity for employees.

System Requirements

Hardware-based KVM Remote Control works on PCs with 2010 Intel® Core™ i5 vPro™ processors and Intel® Core™ i7 vPro™ processors. PCs must have active Intel® HD Graphics with Intel AMT version 6.0 activated and configured. Hardware-based KVM Remote Control does not work on PCs that use discrete graphics.

Future Plans

In the near future, we plan to develop additional use cases for KVM Remote Control, as well as test KVM Remote Control's wireless capability in the lab environment. We also plan to conduct a proof of concept with the Service Desk.

CONCLUSION

Unlike software-based KVM solutions, 2010 Intel Core vPro processors with hardware-based KVM Remote Control can give Service Desk technicians full control of a computer remotely—even when the OS is not functional. In addition, KVM Remote Control provides the ability to use full-screen video and a mouse to diagnose and repair a PC remotely.

We tested KVM Remote Control in six use cases that demonstrate KVM Remote Control's usefulness in remotely solving problems our Service Desk technicians deal with on a daily basis:

- Diagnosing and resolving "blue screen" OS stop errors.
- Resetting passphrases for users.
- Pushing a complete client build to a remote PC.
- Solving network adaptor and network driver problems, even when the PC cannot connect to the network.

- Replacing and or repairing damaged files and hard-drive partitions.
- Making changes to BIOS settings and seamlessly observing the effect of the changes as the PC boots.

We anticipate that KVM Remote Control can significantly reduce the time Service Desk technicians spend solving common IT issues, thereby reducing Service Desk costs. In addition, we anticipate that 2010 Intel Core vPro processor-based laptop PCs could improve employee productivity because KVM Remote Control would allow Intel employees to spend less time solving PC issues and more time producing value for the enterprise.

FOR MORE INFORMATION

For more information on RDS, visit http://communities.intel.com/docs/ DOC-4785.

Watch the video "Intel IT Shows 3 Use Cases with Intel® vPro™ Technology." http://video.intel.com/?fr_story=8a49 cca88626b8db5cf631fa3009be40b8 6e2926&rf=bm

ACRONYMS

Intel® AMT	Intel® Active Management Technology
DLL	dynamic-link library
GUI	graphical user interface
KVM	Keyboard-Video-Mouse
NDIS	Network Driver Interface Specification
IDE-R	integrated drive electronics redirect
RDS	Remote Drive Share
SDK	software development kit
SOL	serial over LAN

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