

Managing a Factory IT Environment with Intel® vPro™ Technology

- Up to 61% potential reduction in deskside visits.
- Improved security due to more reliable patch delivery.
- Energy savings of approximately 64% due to the ability to remotely control the power state of PCs.

Following a successful proof of concept (PoC) test, Intel IT plans to use Intel® vPro™ technology to remotely manage PCs within select factory IT environments. Intel vPro technology is a set of hardware-based capabilities in PCs with Intel® Core™ vPro™ processors that enhances IT's ability to remotely manage, maintain, and protect PCs.

We conducted testing at a small manufacturing site to determine whether, by using Intel vPro technology, we could reduce support and energy costs while improving PC availability and security. We successfully tested four use cases: remote troubleshooting, remote reimaging, interim repair, and power management for more reliable security patch delivery as well as energy savings.

Based on our results and an analysis of Service Desk tickets, we concluded that we could reduce deskside support visits, achieve more reliable patch delivery, and reduce energy consumption, as shown in Table 1. As a result, we plan to use Intel vPro technology to manage all 125 PCs at the site, and we are also evaluating use of Intel vPro technology at other Intel factories.

Our results suggest that Intel vPro technology could deliver similar benefits to other organizations with similar-sized IT environments, such as small and medium-sized businesses.

Table 1. Intel® vPro™ Technology Use Cases and Benefits

| Use Case | Test Results | Business Value |
|--|--|---|
| Remote troubleshooting and reimaging | Verified remote control capabilities; remotely reimaged PC. | Significant potential reduction in deskside visits and hands-on rebuilds; analysis of trouble tickets indicates that 61 percent of problems that previously required deskside support could be resolved remotely. |
| Interim repair | Remotely loaded OS and client software that enabled PC to act as terminal. | Quickly enable PCs with hard disk drive (HDD) failures to function as terminals. This means systems can be up and running in 15 minutes compared with the 1 to 2 hours required for HDD replacement. |
| Power management for patch delivery and energy savings | Remotely powered PCs on and off. | Save about 2 hours per month by being able to reliably power on PCs for patch delivery; approximately 64 percent reduction in average power consumption due to scheduled power on and power off during non-working hours. |

Implementing Intel® vPro™ Technology within the Intel IT Environment

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

Embedded in hardware, Intel vPro technology capabilities can be accessed and administered in a pre-boot environment, without reliance on the hard drive, OS, or software applications. This allows remote access to the PC regardless of the system's power state or OS condition. IT can manage PCs using Intel vPro technology over wired and wireless networks, both within and outside corporate firewalls.

Intel IT sees Intel vPro technology as a core capability for improving system defense, asset discovery, remote builds, virtualized client usages, and device-independent computing. Because of these benefits, Intel IT is implementing Intel vPro technology across our IT environment.

Background

Manufacturing operations are at the heart of Intel's business. Efficiency, availability, and security are paramount throughout the manufacturing environment—including factory IT systems.

To enhance security, Intel's factory IT systems are isolated from the rest of the corporate IT environment so that security compromises cannot spread to vital manufacturing operations. Accordingly, factories have their own dedicated IT support staff—who must work extremely efficiently due to the limited IT resources available at each factory.

At a small manufacturing site in the United States, for example, there are only two dedicated IT support people to manage 125 PCs, 8 physical servers, and 12 virtual servers. The PCs at this factory are primarily used to access a variety of factory management applications. For security reasons, the PCs run a locked-down IT software build and are assigned static IP addresses to prevent ad-hoc addition of new devices to the network.

This factory recently upgraded to new PCs with Intel Core vPro processors, including PCs with 2nd generation Intel® Core™ i5 vPro™ processors. These PCs include Intel vPro technology, a set of hardware-assisted security and manageability capabilities that enhance Service Desk technicians' ability to maintain, manage, and protect systems. (See sidebar.)

Intel IT is deploying Intel vPro technology across our enterprise environment and expects to achieve significant savings as a result. We saw the potential to realize similar benefits within factories, by using Intel vPro technology to more quickly and efficiently resolve PC problems while reducing cost and improving security.

Due to the critical operational requirements of Intel's factories, we undertake extensive testing before introducing new technologies into the factory IT environment. We therefore conducted PoC testing to explore the use of Intel vPro technology to address current IT challenges within the factory:

- Many problems, such as inoperable PCs, currently require deskside visits or costly downtime. In the factory environment, we

need to get PCs up and running as quickly as possible. It would be faster and more efficient if IT technicians could fix these problems remotely.

- At times, all support personnel may be offsite, making remote manageability essential.
- Software updates and security patches are delivered from another facility during off hours; delivery has not been completely reliable because PCs may be powered off during the scheduled delivery time. Manual effort is required to check whether patches were delivered and remediate if necessary.
- We are constantly seeking energy savings. Users may leave PCs on after work hours, so the PCs consume energy even when not in use.

Proof of Concept

We tested four use cases using Intel vPro technology capabilities: remote troubleshooting, remote reimaging, interim repair, and power management for patch deployment and energy savings.

REMOTE TROUBLESHOOTING

Challenge. Without Intel vPro technology, many everyday software-related problems require a deskside visit. These problems include corrupted data or code that can prevent users from launching applications, completing the boot process, or logging on to the network.

With Intel vPro technology. PCs based on 2nd generation Intel Core vPro processors support Keyboard-Video-Mouse (KVM) Remote Control. This capability allows IT to remotely take over users' PCs. It lets IT support technicians see what their customers see, regardless of PC state. Our goal was to use this capability to remotely troubleshoot a variety of problems, including those that prevent PCs from completing the boot process.

Test Procedure and Results

We verified that we could remotely view the user's screen as the user sees it using KVM Remote Control from a support technician's PC. We were able to check that each step of the boot process completed correctly.

REMOTE REIMAGING

Challenge. A system may crash or fail to boot due to a corrupted OS or other significant problems with the build on the hard disk drive (HDD). Today, this requires a Service Desk technician to remove the system from the factory floor and either replace it with a spare or completely reinstall the lock-down build image.

With Intel vPro technology Support technicians can remotely install or reinstall images on the PC from network drives. Our goal was to replace corrupted OS images remotely, eliminating the need for a desk-side visit or to physically take the system for reimaging.

Test Procedure and Results

We were able to successfully reimage PCs using the remote reimaging capability of Intel vPro technology. We created a corporate OS image on a network server and installed it on the PC using a tool that utilized serial over LAN (SOL) and integrated device electronics redirect (IDE-R). We repeated this several times with two different desktop PC models. The process took from about 30 minutes to an hour, depending on network traffic.

INTERIM REMEDIATION OS

Challenge. If the HDD fails or becomes inaccessible, systems may be unusable for a significant period, hindering factory productivity. A failed HDD must be physically swapped out, which takes one to two hours. If the issue is due to software or data problems, it can be fixed using the reimaging process above; however, it may be

important to get PCs back online more quickly than is possible using the reimaging process.

Test Procedure and Results

We devised a process that takes advantage of Intel vPro technology to quickly get a PC functioning on the network. As shown in Figure 1, we loaded a bare-bones Linux* OS into the PC's RAM over the network. This OS included terminal server client software. We used this software to launch a client session to a server running the required applications.

This process enables an employee to quickly resume working, though not with the full functionality of a PC. The entire process took about 15 minutes, compared to the one to two hours typically required to replace a HDD. For a permanent repair, the PC could then be taken offline for HDD replacement or reimaging outside working hours or during scheduled downtime.

REMOTE POWER MANAGEMENT FOR ENERGY SAVINGS AND PATCH DELIVERY

Challenge: In the past, we have not been able to reliably power PCs on and off remotely to enable consistent patch delivery and reduce energy consumption.

Security patches and other updates are typically delivered remotely from another site on weekends, when the factory is not working. However, patches cannot be delivered to some PCs because they have been switched off. To avoid security risks, IT support staff must check each PC after the weekend to determine whether the patches were delivered. They typically must manually power on

and apply patches to five to 10 systems. This can take up to two hours.

The inability to remotely control PC power state also hinders our ability to save energy. The factory typically works from 7:00 to 16:00, so PCs are unused for nearly two-thirds of each 24-hour cycle. However, employees currently leave PCs powered on at all times so that patches can be applied after hours or at the weekend.

With Intel vPro technology: Intel IT can remotely power each system on and off based on a predetermined schedule, or whenever required. This means that we can power up systems to verify patch delivery and that users can now power down their PCs at the end of each day.

Test Procedure and Results

Using the PC Alarm Clock capability within Intel vPro technology, we created a job that remotely powers the factory's PCs on and off at scheduled times. We built a Web interface that enables the factory's managers to power up PCs if the factory is working non-standard hours. We verified that the software consistently powered PCs on and off as intended, enabling reliable patch delivery.

To analyze potential energy savings, we measured and compared PC power consumption. We found that even when running typical workloads, PCs based on Intel® Core™ i5 vPro™ processors used greater than 50 percent less power than our previously installed PCs based on Intel® Pentium® 4 processors. The factory's actual energy savings would be even greater than this, because we could remotely power off the new PCs when not in use.

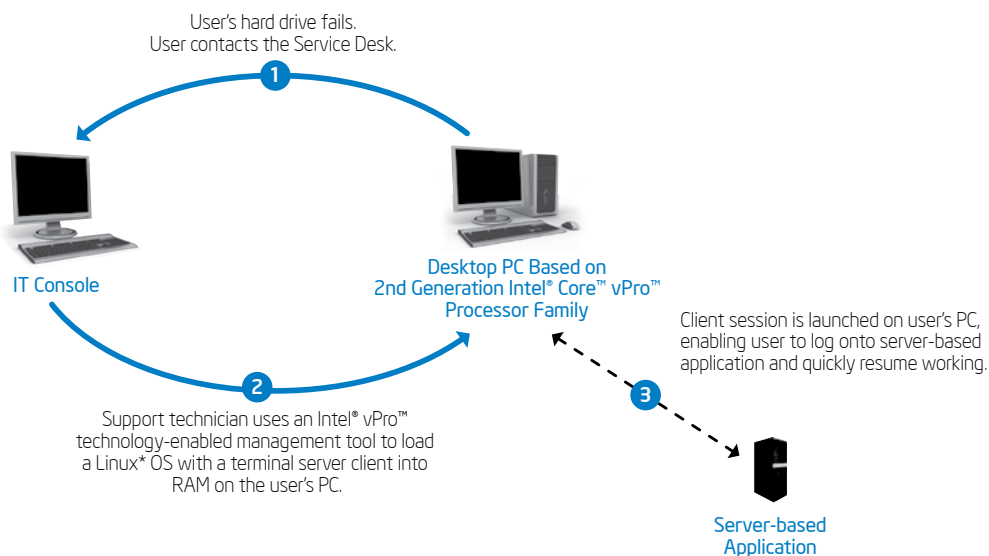


Figure 1. Interim remediation OS use case.

Analyzing the Business Value

We analyzed the potential benefits of implementing our tested Intel vPro technology use cases at the factory.

REMOTE TROUBLESHOOTING AND REMOTE REIMAGING

The biggest benefits to Intel of these use cases are the potential reductions in desktide visits and the ability to diagnose and repair PCs even when the support team is offsite.

To quantify these benefits, we analyzed the 472 tickets received by the factory IT support team during 2010. Of the 472 tickets, 301 required a desktide visit. Users commonly reported problems with loading the OS, or logging into the network or applications. Other tickets were created because users did not understand error messages or how to respond to them. Typical fixes included replacing corrupted files and deleting registry keys.

As shown in Figure 2, we estimate that 61 percent of these tickets (186 out of 301) could have been resolved remotely with Intel vPro technology, by using KVM Remote Control and, in some cases, remote reimaging capabilities.

An additional benefit of Intel vPro technology is that we could potentially use remote reimaging to upgrade to a new OS, such as Microsoft Windows 7*, down the wire.

INTERIM REPAIR

With our PCs based on Intel Core vPro processors, HDD failures are rare. However, in the event

that such a failure occurs, our interim repair use case demonstrated that Intel vPro technology significantly reduces downtime. We can provide a user with access to network applications within about 15 minutes, rather than the one to two hours required previously.

POWER MANAGEMENT FOR PATCH DELIVERY AND ENERGY SAVINGS

The ability to remotely power on PCs enables us to save approximately two hours per month of IT technician time by successfully applying patches to all systems down the wire.

Across the 125 PCs at the factory, we estimate energy savings of approximately 64 percent due to the ability to remotely control the power state of PCs based on Intel Core vPro processors.

Conclusion and Next Steps

Our PoC demonstrated that we can achieve significant productivity, security, and cost benefits due to reduced desktide support visits, more consistent patch delivery, and reduced energy consumption. As a result, we plan to use Intel vPro technology to manage all PCs at the factory, and we are investigating its use at other factories.

Our experiences suggest that Intel vPro technology could deliver similar benefits for other organizations with similar-sized IT environments, such as small and medium-sized businesses.

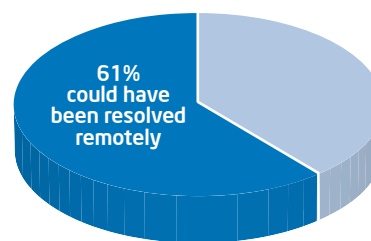


Figure 2. Of the 301 Service Desk tickets in 2010 that required desktide support visits, 61 percent could have been resolved remotely using Intel® vPro™ technology.

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