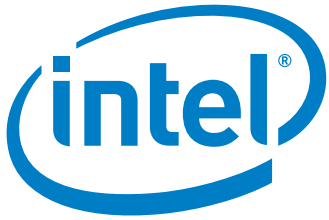


White Paper

Intel Information Technology

Computer Manufacturing

Client Management

Intel® vPro™ Technology: From Provisioning to Use Case Implementation

To increase our ability to remotely manage PCs while driving down management costs, Intel IT is implementing Intel® vPro™ technology throughout our environment. We developed a use case implementation methodology that describes how to identify the highest priority use cases, develop an implementation roadmap, analyze the required changes to support processes, and train support agents. We have used this methodology to successfully implement four enterprise use cases, and we are continuing to use it to implement other use cases on our roadmap.

Gal Eylon, Intel Corporation

July 2009

IT@Intel

Executive Summary

To increase our ability to maintain, manage, and protect PCs while driving down management costs, Intel IT is implementing Intel® vPro™ technology throughout our environment.

We developed a use case implementation methodology that describes how to identify the highest priority use cases, develop an implementation roadmap, analyze the required changes to support processes, and train support agents.

We have used our methodology to successfully implement four enterprise use cases, and we are continuing to use it to implement other use cases on our roadmap.

Intel vPro technology, a hardware-based capability built into desktop and laptop PCs, significantly affects the way we manage PCs, enabling us to remotely perform many functions that previously required on-site support. It is an underlying capability that we can use for incident resolution, asset discovery, and increasing enterprise security.

To use the technology in our enterprise environment, we first need to deploy and activate PCs with Intel vPro technology. The next major step is to implement specific use cases. To do this, we:

- Identified and prioritized use cases by analyzing operational support pain points and matching them to Intel vPro technology capabilities.
- Performed a gap analysis to identify the changes needed to support each use case.
- Trained support desk agents in Intel vPro technology capabilities, enabling them to remotely support users and help identify new use cases.
- Developed tools to help support users and monitor our deployment progress.

By the first half of 2009, we had deployed more than 45,000 systems with Intel vPro technology, and provisioned more than 40,000 of them. We have used our methodology to successfully implement four enterprise use cases. We estimate these will save Intel more than USD 500,000 per year once all of our PCs are based on Intel vPro technology. We are continuing to use the methodology to implement additional use cases on our roadmap. These use cases will further increase the return on investment (ROI) Intel vPro technology delivers.

Contents

Business Challenge

Intel's worldwide computing environment includes more than 100,000 PCs. At Intel, as at most companies, managing and securing these PCs consumes considerable IT resources. To increase our ability to maintain, manage, and protect PCs while driving down management costs, we are undertaking a multi-year program to implement Intel® vPro™ technology throughout our environment.

Intel vPro technology is a hardware-based capability built into desktop and laptop PCs that greatly increases our abilities to securely manage PCs over networks (see sidebar on page 4). This reduces management costs and improves employee productivity, because problems that previously required hands-on support can now be fixed more quickly from our remote support center. Ultimately, we expect to use Intel vPro technology for a broad range of management, security, and other purposes.

Because Intel vPro technology is an underlying capability that significantly changes the way we support PCs, implementation involves more than simply acquiring and provisioning PCs that include the technology.

To fully take advantage of Intel vPro technology across our environment, we needed to identify the most valuable use cases, develop a use case implementation roadmap, and adjust our support processes to support these use cases remotely. We needed to train support agents and educate users.

The methodology we developed helped us make the transition from deploying PCs with Intel vPro technology to full enterprise use case implementation.

Intel® vPro™ Technology

Intel® vPro™ technology is designed to address many of the most costly challenges IT organizations currently face in deploying, maintaining, managing, and securing clients. It provides out-of-band capabilities that let support teams securely access and manage PCs over networks even when an OS is unresponsive, a software agent is missing, or a hard drive has failed.

It also contains other features that can enhance a wide range of client management functions. A partial list includes persistent and protected storage for event logs and asset information, configurable hardware-based traffic filters, and programmable triggers and responses for protecting Internet-connected PCs.

Use Case Implementation

Our use case implementation methodology included the following steps:

- Identifying the highest-priority use cases.
- Performing return on investment (ROI) analysis.
- Building a use case implementation roadmap.
- Developing future process flows for the new use cases.
- Performing a gap analysis for each use case to identify the changes required for implementation.
- Training support agents and developing scripts.
- Developing tools.

Identifying Use Cases

We began by identifying the highest-priority Intel vPro technology use cases. Our goal was to identify where we could deliver the greatest value with the least implementation effort.

We quickly realized that we could obtain the greatest value by using the out-of-band capabilities of Intel vPro technology to address problems that we could not previously solve using our existing in-band management tools. We didn't want simply to substitute Intel vPro technology to solve problems these tools could already address.

There are a number of well-known, published use cases,[1] including software inventory management and remote diagnosis with remote repair. However, Intel vPro technology can be used to solve many problems—not just the well-known ones. Rather than simply selecting from a list, we wanted to identify the use cases that were most important to Intel IT and Intel's users.

To identify our highest-priority use cases, we determined which Intel vPro capabilities our environment could support (a bottom-up approach), and analyzed our biggest operational support pain points (a top-down approach). We compared capabilities with pain points to develop a use case implementation roadmap.

Bottom-up Approach: What We Can Do

To determine what we can accomplish using Intel vPro technology, we analyzed which of its capabilities our environment supports. We assessed this by examining the support at each layer of the environment, as shown in Figure 1.

1 See: http://software.intel.com/en-us/articles/architecture-guide-intel-active-management-technology

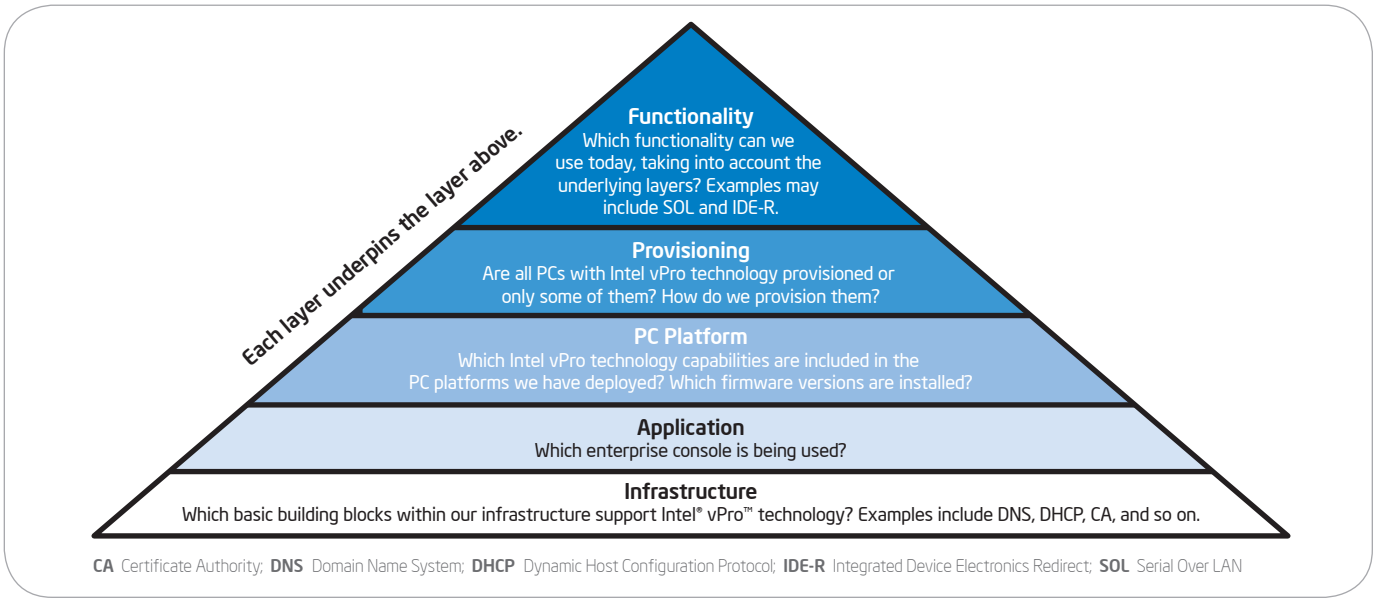


Figure 1. Analyzing support for Intel vPro technology at different layers of our environment.

From this analysis, we determined which functionality could be provided using Intel vPro technology, when the functionality would be available, and which PCs we could support.

The support at one layer of the environment underpins the capabilities in the layers above. Using this approach, we determined that serial over LAN (SoL) and integrated device electronics redirect (IDE-R) functions are available today from our enterprise console, and we can use those functions to manage our PCs with Intel vPro technology over the corporate LAN.

We developed a timeline showing when we expect additional Intel vPro technology functionality to be available for use during 2009 and 2010; this timeline is dependent on the delivery of the required features across all underpinning layers.

Top-down Approach: What We Want To Do

To identify our biggest pain points, we analyzed our incident and problem management database. We selected the incidents and service requests that generate the greatest call volumes, result in the highest cost to Intel, or have the greatest impact on users. This provided us with a prioritized list of the most important use cases.

Building The Roadmap

We developed a use case implementation roadmap by matching our prioritized use cases to the timeline of available functions. Wherever there was a match—indicating that the use case could be supported by our environment—we placed the use case on the roadmap for potential implementation. We then performed ROI analysis for each use case to determine whether to implement it at that time.

Using this process, we identified four high-priority use cases that could be implemented immediately: remote configuration; power management; remote diagnosis and remote repair; and remote diagnosis and local repair. We have also identified other use cases—such as system defense, remote client builds, and asset discovery—that we plan to implement later, once our environment provides the required support.

ROI Analysis

We use standard Intel ROI analysis to determine which use cases to implement, analyzing and comparing the financial benefits.

Assumptions

Our analysis was based on a number of assumptions and data points:

- Based on our current PC refresh plans, all or nearly all of our PCs will be based on Intel vPro technology by the end of 2010.
- Average difference, in cost per incident, between solving an issue remotely and using on-site support.
- Number of PCs with Intel vPro technology that have been provisioned, based on our Intel vPro technology deployment plan.
- Number of incidents and service requests, based on 2008 data from our incident management system and on current trends.
- Headcount required for engineering, program management, and training.

Benefits

We based our decisions on hard ROI—a conservative approach focusing primarily on the lower cost of remote support. For example, remote configuration lets us remotely configure users' PCs when they are in a pre-OS state. This eliminates the need for users to take their laptop PCs to an on-site PC service center. For each use case, we included estimated cost savings based on the estimated difference between the current on-site support process and the future remote support process.

We did not include soft ROI—user productivity gains—in our ROI calculations. However, we did estimate the value of these productivity gains. Issues can be solved more quickly using Intel vPro technology, resulting in increased user productivity. We calculated the value of this by estimating the decrease in mean time to repair (MTTR)—which becomes the average time savings for each user—and multiplying it by the appropriate employee burden rate.

Costs

The primary cost was head count, including the engineering, project management, and training resources required for the implementation. We did not include hardware and hosting costs, because each use case reuses our existing infrastructure including the PCs with Intel vPro technology that we have been deploying. IT organizations that identify additional hardware costs may choose to include this cost in their ROI calculations.

Analyzing the Changes Required to Implement Each Use Case

When we begin using Intel vPro technology to address a problem, there may be changes to some support activities. Without Intel vPro technology, a laptop user typically visits a PC service center, where on-site technicians provide support; with Intel vPro technology, the user calls the helpdesk and agents provide the support remotely.

We needed to understand and analyze all the changes required to implement each use case.

Mapping Process Flow

We first mapped the steps in our planned new process based on Intel vPro technology. We called this the "to-be" process. We mapped the process at a generic, high level without going into details of specific incidents that we could resolve within this use case. This approach resulted in a high-level description that all stakeholders could understand and agree on. We need to perform this exercise for each use case. The "to-be" process flow for remote configuration, one of our four highest-priority use cases, is shown in Figure 2.

Gap Analysis

By comparing the "to-be" process flow with our current "as-is" process flow, we identified the gaps between our current and future states—the things we needed to change in order to implement the use case.

For each step in the new process, we identified the gaps and grouped them into categories—such as scripts, training, required tools, and communication. Then we assigned responsibility for filling the gap to a specific group within Intel. For our remote configuration use case, we identified 16 gaps. Examples are shown in Table 1.

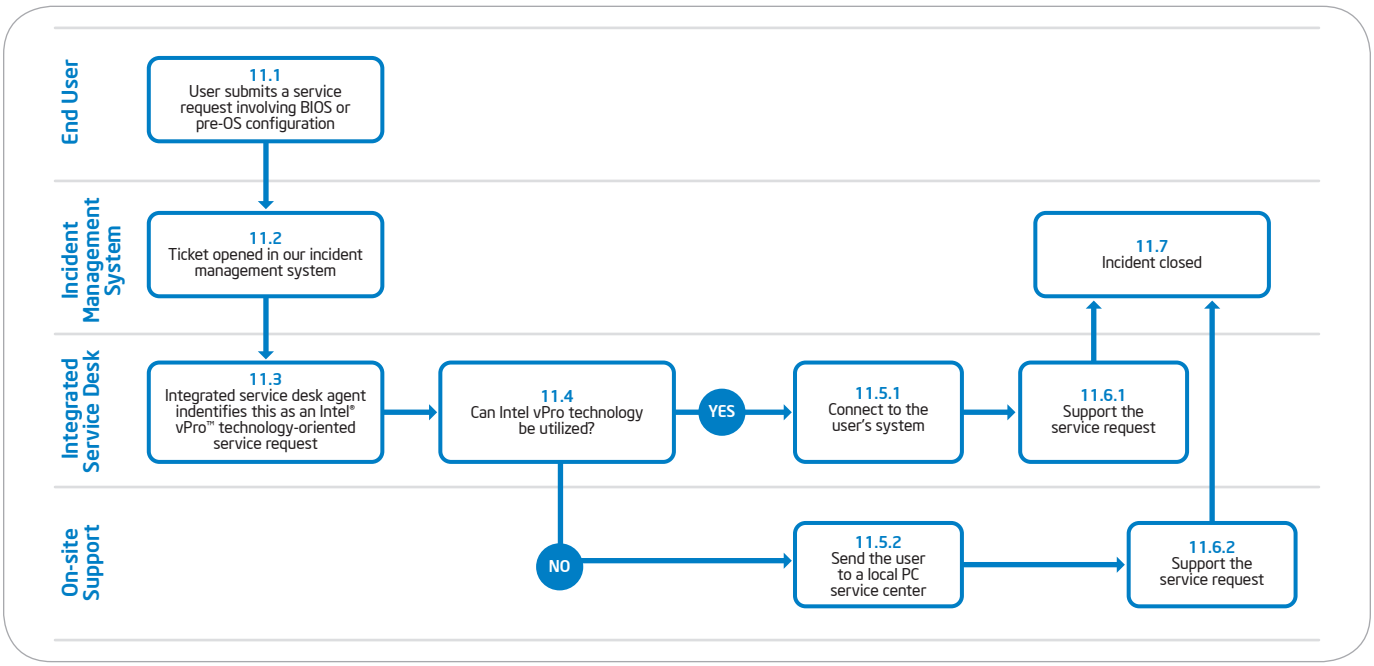


Figure 2. "To-be" process flow for the remote configuration use case.

This gap analysis provided us with a list of actions that we integrated into our overall project plan. It provided a basis for estimating the resources required and proved to be a powerful tool for demonstrating our plans and requirements to stakeholders.

Drilling Down to Specific Incidents

A use case represents a category of problems that we can address using a single general process. However, we needed to drill down to identify specific service requests and incidents that fall within this general use case. These are the problems that our support agents will actually deal with.

For example, within our remote configuration use case, we identified three specific types of service request that currently consume considerable support resources. Without Intel vPro technology, each of these typically requires hands-on support; they cannot be supported using existing in-band management tools because they require out-of-band connectivity in order to remotely configure the PC before the OS has loaded. With Intel vPro technology, we can resolve each of these with our remote configuration process using SoL.

- **Update hard drive password.** Users typically do not know how to do this themselves, so they seek support. Without Intel vPro technology, this is best handled by an on-site support technician. It is extremely difficult to describe the process to users over the phone—and because the user is working at the BIOS level, a mistake by the user could have serious consequences. With Intel vPro technology, a support agent remotely reboots the PC and performs the process on behalf of the user. The user merely has to type in the password when prompted to do so.
- **Configure Trusted Platform Module (TPM).** With Intel vPro technology, the support agent configures the TPM PC security hardware by setting specific required fields over a secure remote connection.
- **Reset hard drive encryption paraphrase.** This involves entering a long character string; it is hard to accurately relay this information to the user over the phone. With Intel vPro technology, the agent can perform the reset operation remotely.

Table 1. Part of the Remote Configuration Gap Analysis

Step	Step Description	Domain	Gap	Description	Approach	Responsible Group
11.1	User submits a service request involving BIOS or pre-OS configuration.	Communication	Educating our end users.	We need to set user expectations and educate users to understand that this can be resolved remotely.	We would need to communicate with our customers that we can now configure BIOS and pre-OS items remotely and there is no need to walk into our on-site PC service centers. In addition, we would need to educate our on-site technicians and equip them with the right messaging in case a user walked into a local PC service center for this type of support.	On-site support
11.3	Integrated service desk (ISD) agent identifies this as an Intel® vPro™ technology-oriented service request.	Training	Identifying an Intel vPro technology-oriented related incident.	Train ISD agents on Intel vPro technology capabilities and resolution of all relevant incidents.	This should be embedded in the ISD agent training package.	Service desk
11.6.1	Support the service request.	Scripts	Support scripts are required.	We need to update the ISD support scripts to make sure agents know how to resolve this step by step.	ISD agents should be trained and develop good troubleshooting skills. This will take time as they gain experience with Intel vPro technology.	Service desk
11.5.2	Send the user to a local PC service center.	Scripts	Incident hand off.	Hand over the incident from the ISD to on-site support technicians.	We need to communicate with users, letting them know what would occur, who will be contacting them, and how and when.	Service desk plus on-site support

Training the Support Team

With Intel vPro technology, our support agents now support a range of incidents and service requests that previously were supported by on-site technicians. We needed to train them to enable them to do this.

We also wanted to achieve a second, equally important goal: teaching agents to act as an extension of our core Intel vPro technology team. We have about 200 support agents—about 10 times as many people as in our core team. Because support agents deal with users' problems every day, they are in the best position to identify new ways we can use Intel vPro technology. If we can train them to do this, we are effectively adding 200 people to our Intel vPro technology team.

This requires training that helps support agents think in new ways. If we teach agents merely to resolve existing problems by rote, they are unlikely to think of new uses. If, in contrast, we focus on teaching them the capabilities of Intel vPro technology, they are more likely to come up with innovative new uses. To provide further encouragement, we provided incentives for coming up with new ideas.

We sent Intel vPro technology experts to provide face-to-face training. The training focused on helping agents understand Intel vPro technology and how it could improve PC support, rather than on the details of the steps required for specific incidents. Our experts also created videos that proved extremely effective in demonstrating the use of the technology to solve problems.

Our strategy worked: Support agents have been responsible for identifying several incidents that we now resolve using Intel vPro technology, including the one that currently generates the largest ROI—resetting a user's hard drive encryption paraphrase.

Scripts

We also developed detailed support scripts to help agents walk through the steps required to resolve each incident using Intel vPro technology. Overall, support agents have to deal with hundreds of different types of support requests, and they cannot memorize all the steps required for each one.

Tools

We identified a need for two new tools to support our Intel vPro technology deployment: A provisioning status tool that identifies whether a user's system is manageable using Intel vPro technology and a dashboard that displays real-time information about the overall state of our Intel vPro technology environment, including current provisioning status, up-to-date usage of each use case, and the ROI to date.

Provisioning Status Tool

Because we are still in the process of deploying PCs with Intel vPro technology, some users have older PCs that do not include the technology. Other users may have systems that include Intel vPro technology but are not yet manageable because we have not yet provisioned Intel vPro technology on all PCs with Intel vPro technology.

When a user calls the service desk, our agents need to be able to identify whether the user's PC is based on Intel vPro technology and whether the technology has been activated (provisioned) so that it is remotely manageable. We developed a tool to do this, shown in Figure 3. The user provides their Intel employee number by phone, and the support agent enters this number into the tool.

The tool then displays all the relevant information, including the user's PC model and configuration, and whether it is an activated Intel vPro technology-based PC. The support agent then simply clicks a button to connect to the user's PC using Intel vPro technology.

To provide this information, the tool needs to access data from several systems: our human resources system, our asset management system, and the Intel vPro technology database.

If support agents identify that the user has a PC with Intel vPro technology, but the PC is not manageable because it has not yet been provisioned, they can execute a script that results in the user's system being provisioned. This means that the next time the user calls in, the user's system will be fully provisioned and manageable.

Dashboard

We developed an Intel vPro technology management dashboard, shown in Figure 4, which shows the status of our Intel vPro technology environment in real time. The dashboard lists statistics such as the number of provisioned systems, resolved and unresolved incidents, and financial savings. It compares the actual numbers with our targets.

We initially used the dashboard to track progress against our provisioning targets during 2008. Now we use the dashboard to track our continuing progress—including savings to date, based on the number of incidents resolved and the ROI analysis for each.

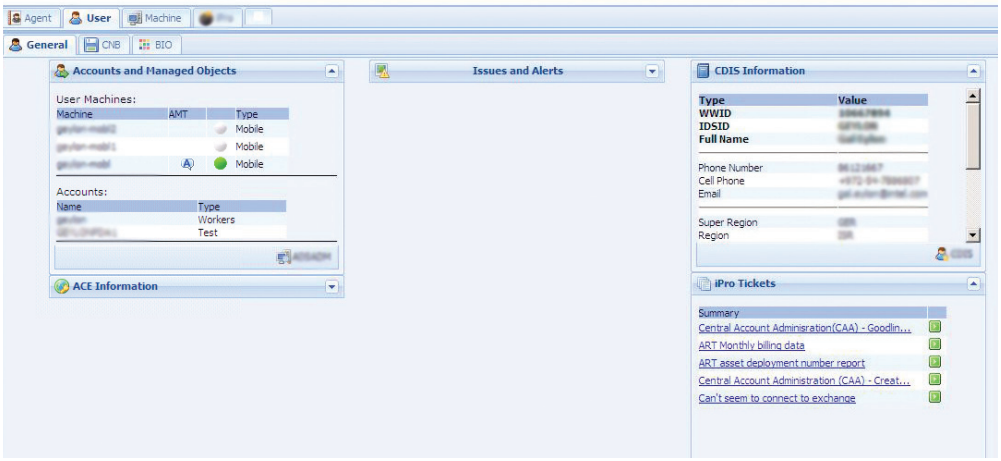


Figure 3. System identification tool. We developed this support tool to quickly identify whether a user's PC is manageable using Intel® vPro™ technology. The challenge was to display all manageable clients owned by the user, using only the user's Intel ID number. The user provides this number over the phone when he or she calls the service desk. To achieve this, the tool first searches for all the user's client machines by cross-referencing our human resources database with our asset management database. The tool then filters the resulting list so that it includes only PCs with Intel vPro technology, and finally cross-references this list with our management console database to identify fully provisioned, manageable PCs. These steps are performed automatically as background tasks, taking seconds. We incorporated this tool into the existing support agent portal. It is now used for all use cases that require identification of manageable clients during a phone call.

Metric	Measurement	Total vPro Systems	2009			Q1 2009			Q2 2009			Q3 2009			Q4 2009		
			Goal	Actual	Status	Goal	Actual	Status	Goal	Actual	Status	Goal	Actual	Status	Goal	Actual	Status
vPro provisioned systems (primary wired campus)	# of provisioned systems / # of vPro systems																
vPro provisioned systems (primary wireless campus)	# of provisioned systems / # of vPro systems																
vPro Manageable Systems (primary wired campus)	# of manageable systems / # of Provisioned systems																
vPro Manageable Systems (primary wireless campus)	# of manageable systems / # of Provisioned systems																
vPro Adoption	# of deployed Use Cases																
	Potential Tickets related to vPro																
	Incidents successfully resolved with vPro																
	Realized gain (in $s)																
	vPro Relevant Incidents that were not solved with vPro																
	Unrealized gain (in $s)																

Figure 4. Intel IT's Intel® vPro™ technology management dashboard. The Intel vPro technology management dashboard is designed to provide real-time information to enable data-driven decision making. It was originally built to provide data about our provisioning progress. It has subsequently been expanded to include use case implementation progress and ROI. To populate the fields within the dashboard, we needed to extract and consolidate data from our console database and client agent (for provisioning progress) as well as our incident management database. The tool then manipulates the data to calculate real-time ROI for each use case. The dashboard was a key deliverable identified at the start of the project. It provides a single reference source for tracking provisioning progress and is used in executive management reviews. We use the dashboard to analyze provisioning progress and allocate resources accordingly to meet our targets. Use case implementation data is reviewed weekly to analyze trends and to help ensure implementation and ROI meet our projections.

Key Learnings

We learned many valuable lessons that we can apply as we continue to expand and enhance our Intel vPro technology environment.

Reuse

Our gap analysis process showed that multiple use cases share the same gaps. This means that we can reuse many of the solutions developed for one use case to ease the adoption of another.

For example, during a call to the service desk, several use cases include the need to identify whether a user's system can be managed using Intel vPro technology. We reuse our system identification tool (shown in Figure 3) to plug this shared gap in each of these use cases. We are also reusing support scripts and processes, training materials, incident management system queues, and the communications that we send to end users and business groups.

Changing the Way Agents and Users Think

Focusing on changing the way agents and users think, through training and education, is as important as developing the processes and tools. Intel vPro technology helps change the organizational mindset, which requires careful thought and planning. Agents need to have an open mind about how to solve problems remotely using Intel vPro technology. Users need to learn to contact the support desk rather than simply taking their PC to on-site technicians.

Starting Small

Implementation takes time, as is the case with adoption of any major new capability. We learned that it is wise to start small, by choosing several use cases that are easy to implement before moving on to more complicated ones. Value grows over time as more use cases are implemented.

Future Goals

We are working toward several future goals.

Faster Use Case Implementation

It currently takes about six months to implement a use case, from conception to deployment. This includes putting in place the appropriate support processes. However, we ultimately want to be able to move from business requirement to implementation much more quickly—ideally in about a week for easier use cases and up to a month for those that are more complicated.

This rapid implementation would let us use Intel vPro technology to address a much wider range of use cases—particularly emergencies and other ad-hoc needs. Today, these are some the most expensive problems we face, because they require immediate, manual, on-site support. An example would be an outage that affects a large number of PCs. If we can solve these problems remotely using Intel vPro technology, we can deliver significant benefits to Intel.

A Decentralized Approach

We developed our initial implementation using a centralized "push" approach: Our core Intel vPro technology team identified the four use cases and managed the implementation process.

As the use of Intel vPro technology spreads beyond what can be managed by a single small team, we are moving to a more decentralized approach starting in 2009. Initially, other groups within Intel may select the use cases they need, and our core team will help implement them.

Ultimately, we anticipate a completely decentralized, "pull" approach in which groups both identify and implement their own use cases, without requiring approval from a central team, and using the framework that we have put in place.

Conclusion

Intel vPro technology is a powerful capability that can be used to remotely address a wide range of PC problems that previously required on-site support. Because Intel vPro technology is an underlying capability that significantly changes the way we support PCs, implementation involves more than simply deploying PCs that include the technology.

We created a process that enabled us to successfully identify use cases, develop a use case implementation roadmap, and adjust our support processes to remotely support these use cases.

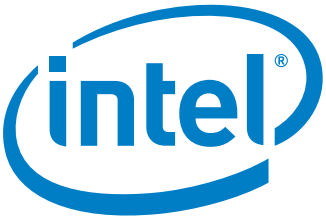
We have already begun to realize the benefits, and we expect these benefits to increase as we deploy and provision more PCs with Intel vPro technology and implement more use cases.

As of June 2009, we have provisioned over 40,000 PCs with Intel vPro technology, and we are expecting to exceed 50,000 by the end of 2009. We are adding more PCs with Intel vPro technology through our standard refresh cycle; based on our current refresh plans, all or nearly all of our PCs will be based on Intel vPro technology by the end of 2010.

Once 100 percent of our PCs are manageable with Intel vPro technology, we estimate that the four initial use cases—remote configuration; power management; remote diagnosis and remote repair; and remote diagnosis and local repair—will save Intel more than USD 500,000 per year in reduced support costs.

We have also identified other use cases—such as system defense, remote client builds, and asset discovery—that we plan to implement using the methodology we have developed. As we add more use cases and capabilities such as user-initiated connection and keyboard, video, mouse (KVM) remote control, we expect that the value Intel vPro technology delivers will continue to grow.

For additional content on Intel IT's best practices on this topic, go to www.intel.com/it



Author

Gal Eylon is a program manager with Intel IT.

Acronyms

CA	certificate authority
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
IDE-R	integrated device electronics redirect
ISD	integrated service desk
KVM	keyboard, video, mouse
MTTR	mean time to repair
ROI	return on investment
SoL	serial over LAN
TPM	Trusted Platform Module

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