TOTAL COST OF OWNERSHIP: SAVE WITH A LENOVO THINKPAD YOGA INTEL vPRO 2 IN 1 DEVICE VS. SEPARATE LAPTOP PLUS TABLET

INTEL vPRO™ 2 IN 1

LENOVO® THINKPAD® YOGA

A SINGLE DEVICE THAT PERFORMS AS BOTH A TABLET AND A LAPTOP PROVIDED REAL SAVINGS FOR ORGANIZATIONS VS. LAPTOP-PLUS-TABLET SOLUTIONS*

-SAVE-

$1,565

per user over three years compared to a laptop and Apple® iPad® Air

OR

-SAVE-

$1,693

per user over three years compared to a laptop and Android™ tablet

2 IN 1 BENEFITS

IT'S A TABLET  AND  IT'S A LAPTOP

MANAGEABILITY
Manage one device per user, not two

SECURITY
Hardware-assisted security with Intel vPro in both modes

SOFTWARE
Run single instances of software per user

FLEXIBILITY
Workers get the convenience of two devices in one

**Estimated savings over three years compared to a Lenovo ThinkPad T440 laptop paired with either an Apple® iPad Air™ or a Samsung Galaxy Note® 10.1 2014 Edition tablet*

FEBRUARY 2014 (Revised)

A PRINCIPLED TECHNOLOGIES WHITE PAPER

Commissioned by Intel

SUMMARY

The Intel vPro 2 in 1, a type of device that transforms from a laptop to a tablet and back again, can be the best and least expensive way for an organization to meet the needs of workers who want the portability of a tablet and the business functionality of a laptop. This versatile class of devices boasts the sleek design, light weight, impressive performance, and long battery life of an tablet.

Here, we look at the Lenovo ThinkPad Yoga, a laptop that rotates to convert to a tablet. The 12.5-inch Lenovo ThinkPad Yoga Multimedia Business model we consider in this report is a 2-in-1 device that supports a range of 4th Generation Intel Core™ i3 to Core i7 processor options including the Intel Core i5 vPro processor we include here.

We analyzed three-year costs and value for an organization that plans to purchase two devices for each staff member—a sub-$1,000 laptop and either an Apple iPad Air or an Android consumer tablet—both of which the organization will manage, secure, and support. Our analysis shows that instead purchasing a single Lenovo ThinkPad Yoga, a Intel vPro 2 in 1 that would be a less expensive and more secure alternative for the organization and provide a better laptop plus tablet experience for users (see Figure 1). The exact savings we found are specific to the device models we chose and the assumptions we made (see Assumptions).

Savings for organization with one device instead of two	By replacing the two planned devices—a laptop plus consumer tablet—with a Lenovo ThinkPad Yoga with Intel vPro technologies, the organization saves in the following key ways: • Hardware costs and hardware support plans can be lower for one device instead of two. • IT departments can perform less work and reduce staff costs by managing and securing one device instead of two. • Software purchases are for only one device instead of two. • The longer lifecycle of business-class tablets and laptops versus consumer tablets reduces replacement costs for consumer tablets. • The organization avoids costs for accessories and peripherals for a second device. (Note: We did not include these costs in our TCO analysis.)
4th Generation Intel Core vPro processor adds more possibilities to save	The Lenovo ThinkPad Yoga with its 4th Generation Intel Core vPro processor adds to savings if you take advantage of its remote management and security features. In our model, the laptop we pair with the consumer tablets is less manageable because it lacks Intel vPro Technologies.
Savings add up	We estimate savings per user over three years for the Intel vPro 2 in 1 Lenovo ThinkPad Yoga compared with a Lenovo ThinkPad T440 Laptop paired with an Apple iPad Air or Samsung Galaxy Note 10.1 2014 Edition tablet: • $1,565 over 3 years compared to a laptop and iPad • $1,693 compared to a laptop and Android tablet We see a savings advantage even if the employee rather than employer pays for the device.

Figure 1: Savings with Intel vPro 2 in 1 Lenovo ThinkPad Yoga.

The benefits of 2 in 1 vPro device extend beyond cost savings. Figure 2 summarizes some of those advantages.

Manageability	IT manages one device per user instead of two. It can manage the device using the management tools and procedures already in place for managing other Windows® 8 devices.
Security	IT can take advantage of the built-in remote management and security features of the 4th Generation Intel Core vPro processor on the Intel vPro 2 in 1 and the enterprise-grade manageability available with Windows 8.1 Pro. IT benefits with one device instead of two to secure.
Software	Users can run same business software in tablet and laptop mode or add Windows 8 apps. Shared software adds convenience for workers and saves the organization the cost of having to buy and support software on two devices.
2 in 1 flexibility provides better laptop plus tablet experience for users	The Intel vPro 2 in 1, such as the Lenovo ThinkPad Yoga, gives workers the convenience of having two business devices in one – a tablet and a laptop. The 2 in 1 also gives users a better tablet experience for work than a consumer tablet. Like consumer tablets, the 2 in 1 is good for consumption (watching video or browsing) but it also allows for solid business productivity. In particular, the 2 in 1 delivers a better tablet experience than a consumer tablet for users running business workloads on Microsoft® Office or other Windows software.

Figure 2: Benefits of Intel vPro 2 in 1 device.

Our analysis shows that the Intel vPro 2 in 1 Lenovo ThinkPad Yoga is a less expensive, more usable, and more secure option for the organization. Additional user productivity, potential for cellular cost savings, and possible cost avoidance from security threat prevention could add to that cost advantage. We will discuss those separately in Appendix B.

2 IN 1 SAVINGS

We compared three-year costs for an organization considering three purchase options: a laptop plus an iPad, a laptop plus an Android tablet, or the Intel vPro 2 in 1 Lenovo ThinkPad Yoga. We based the analysis on features and costs for specific hardware models. For the Lenovo ThinkPad Yoga, we selected a configuration with a 4th Generation Intel Core i5 vPro processor. We estimated savings for the Lenovo ThinkPad Yoga solution compared to a Lenovo ThinkPad T440 Laptop with a 4th Generation Intel Core i5 processor, which we paired with 32GB Wi-Fi-only models of either an Apple iPad Air or a Samsung Galaxy Note 10.1 tablet.

Savings with Lenovo ThinkPad Yoga

Figure 3 summarizes the results of our cost analysis for a hypothetical business that wants to choose the best laptop-tablet combination for users. This figure takes into account three-year costs for hardware and hardware support; consumer tablet replacement costs after two years, software to view and edit Microsoft Office documents and spreadsheets on each device; management software costs; and IT costs

to deploy, manage, secure, and support the devices. The Lenovo ThinkPad Yoga, a Intel vPro 2 in 1 device, offers considerable savings over the alternatives.

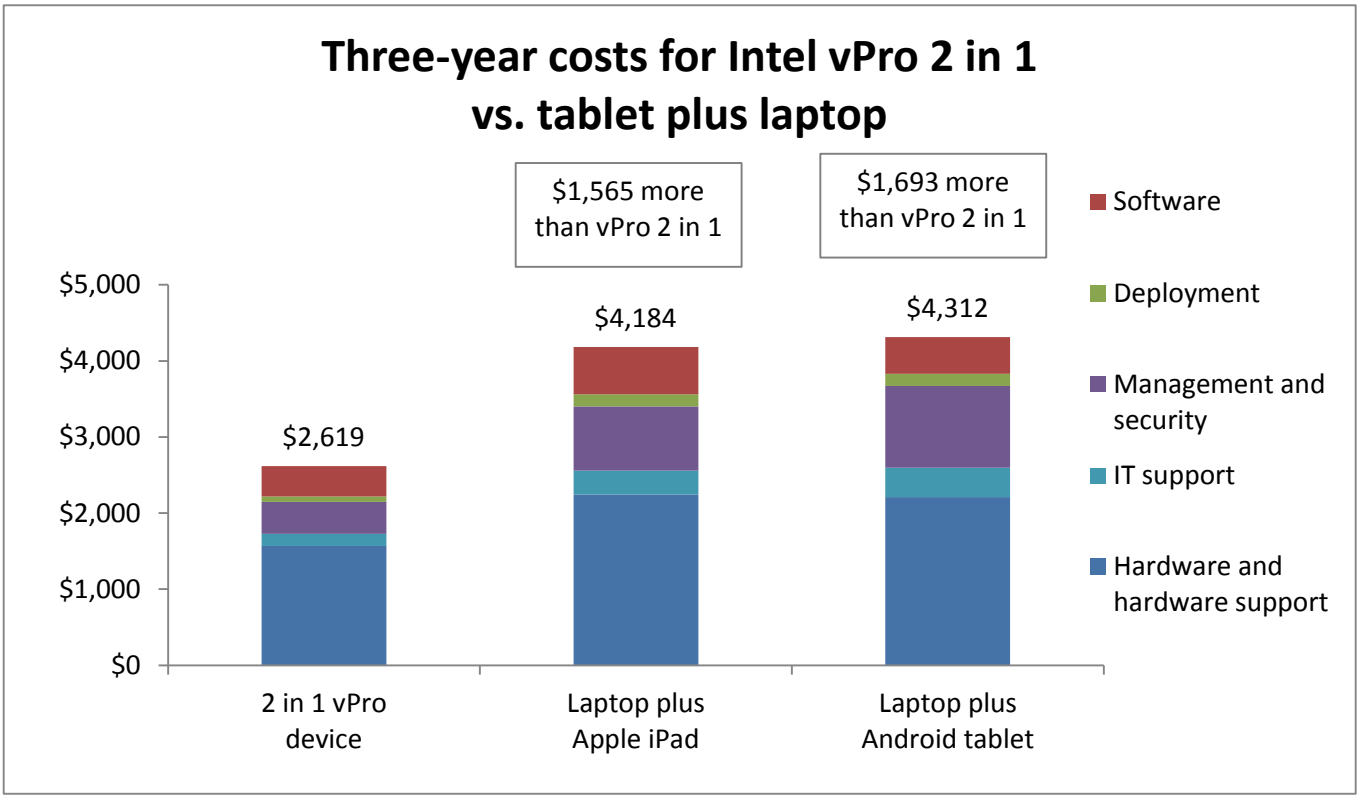

Figure 3: Three-year costs for the three solutions we analyzed.

Figure 4 shows that three-year costs are 37 percent to 39 percent lower for the Intel vPro 2 in 1 Lenovo ThinkPad Yoga compared to the two-device options.

Three-year costs	Intel vPro 2 in 1 Lenovo ThinkPad Yoga	Apple iPad plus Lenovo ThinkPad T440 Laptop	Android tablet plus Lenovo ThinkPad T440 Laptop
Hardware and hardware support, including tablet replacement costs for consumer tablets	$1,568.00	$2,244.92	$2,210.40
Software (Office 365™ or Office 2013 and management software)	$399.99	$620.00	$479.99
Deployment	$72.00	$160.00	$160.00
Management and security	$421.42	$842.83	$1,076.95
IT support	$157.98	$315.96	$384.96
Total (rounded)	$2,619.00	$4,184.00	$4,312.00
Savings for Intel vPro 2 in 1		$1,565.00	$1,693.00
Percentage savings for Intel vPro 2 in 1		37%	39%

Figure 4: Three-year costs for the three solutions we analyzed.

The models we compared

We used the following models (for which we provide detailed specifications in Appendix A):

- **Intel vPro 2 in 1 device.** The Lenovo ThinkPad Yoga configured with a 4th Generation Intel Core i5 vPro processor, 4 GB of memory, a 128GB SSD, and Microsoft Windows 8.1 Pro.
- **Apple iPad.** Apple iPad Air with 32 GB of storage and Wi-Fi capability.
- **Android tablet.** Samsung Galaxy Note 10.1 with 32 GB of storage and Wi-Fi capability.
- **Laptop.** We paired the iPad and Android tablet with a Lenovo ThinkPad T440 Laptop, which in its base configuration includes 4 GB of memory, and a 500GB hard drive. We customized it with a 4th Generation Intel Core i5 processor and Microsoft Windows 8 Pro and removed the Fingerprint Reader that the base configuration included.

Keys to savings

Figure 5 describes the keys to those savings.

Keys to savings	Organization purchases employee a laptop and a consumer tablet	Organization purchases a 2 in 1 device with both laptop and tablet modes
Hardware and hardware support – one device instead of two saves on hardware and support costs	The business must buy two devices and pay for two hardware support plans.	The 2 in 1 solution saves all the hardware and hardware support costs of the consumer tablet.
Hardware and software support – expect to replace laptops and business tablets after three years, consumer tablets after two	Consumer tablets are replaced more frequently than laptops. In our three-year model, we add costs to replace the consumer tablets after two years.	The 2 in 1 solution does not include any consumer tablets that need replacement.
IT support – one device instead of two saves on support costs	IT must support twice as many devices, plus two device types, and handle questions about synchronizing the two devices.	IT supports one device.
Management and security – one device instead of two saves on management costs	IT must manage both devices and deploy mobile device management (MDM) tools to manage the tablet.	The tablet mode of the Intel vPro 2 in 1 device eliminates the need to deploy, manage, secure, and support a separate tablet device for each worker, saving the management and security costs associated with that device.

Keys to savings	Organization purchases employee a laptop and a consumer tablet	Organization purchases a 2 in 1 device with both laptop and tablet modes
Management and security – Intel Core vPro processor on the 2 in 1 device adds manageability that the laptop lacks	Laptops without the built-in manageability and security of Intel vPro processors cost more to manage and secure.	Intel Core vPro processors streamline management and security, saving on IT labor and costs while helping organizations secure the devices from security breaches. A durable case should keep repair costs low.
Software – software for one device instead of two saves money	It is necessary to duplicate software on a laptop and a tablet to give users the ability to view and edit Microsoft Office files across the platforms and carry out other business tasks.	The business buys and tracks software on only one device.
Accessories – one device instead of two to accessorize	While we did not include accessory costs in our analysis, the business or user would need to budget for docking stations, chargers, and covers or carriers for two devices.	Fewer accessories needed for a single device.

Figure 5: Keys to savings in scenarios of businesses purchasing devices for employees.

Savings with BYOD (bring your own device)

Some organizations, rather than purchasing the devices, allow employees to buy their own devices and use them for personal and work tasks. In such cases, many of the same savings for the Intel vPro 2 in 1 device also apply.

Business users frequently rely on their personally owned devices for work. A recent survey by Intel on mobility in the business place showed that about 39 percent of workers use their own laptops for work and 61 percent use their own tablets.[1] They use these devices to access corporate email, access files on corporate servers, and open and send attachments. Organizations put corporate data at risk if they let unmanaged or insecure devices access information on email or networked files.

When workers bring in multiple BYOD devices (laptops, tablets, and smartphones), they add to the number of devices IT must manage and to IT workload. 2 in 1 devices used in BYOD situations reduce device count and both IT load and costs.

We also looked at BYOD variations for the three models. When workers bring their own devices, the organization saves hardware and hardware support costs for the devices, but still incurs all the other costs that we describe in Figure 3, including the costs to deploy software, and manage, secure, and support the devices. Organizations benefit if workers consolidate their laptop and tablet devices by using a Lenovo ThinkPad Yoga, a Intel vPro 2 in 1 device. Figure 6 illustrates these cost savings. We omitted the hardware, hardware support, and device replacement costs but left other

[1] www.intel.com/content/www/us/en/enterprise-mobility/enterprise-mobility-insights-infographic.html

costs the same from the previous graph (Figure 3). We included software and deployment costs in this model because we assumed the business purchases, deploys, manages, and supports business software for these devices.

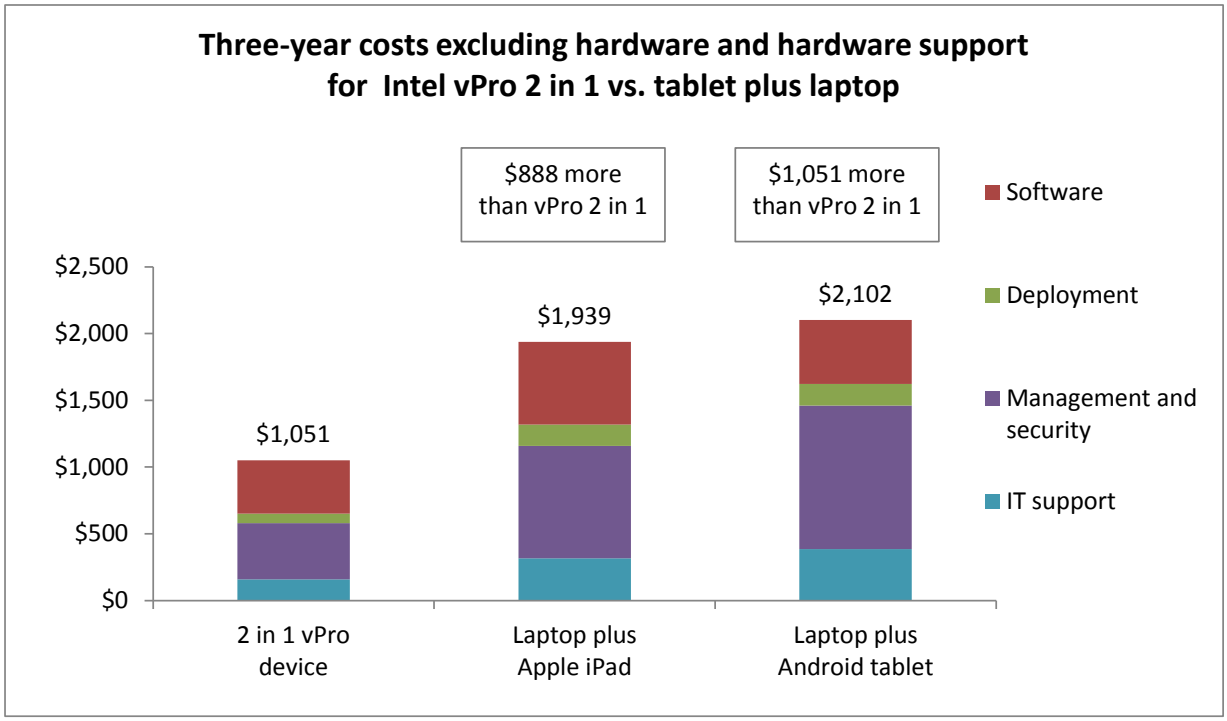

Figure 6: Three-year costs, excluding hardware and hardware support (original purchase plus replacement costs) for the three solutions we analyzed.

2 IN 1 BENEFITS

With both employer-purchased and BYOD devices, the organization and workers benefit with the Intel vPro 2 in 1 solution.

Better manageability and security for organization

IT benefits by having one device instead of two to manage and secure. IT gains additional benefit because the Intel vPro 2 in 1 devices have the built-in remote manageability and security features of the 4th Generation Intel Core vPro processor and enterprise-grade manageability features available with Windows 8.1 Pro.

Better experience for workers

With both employer-purchased and BYOD situations, the benefits of Intel vPro 2 in 1 devices extend beyond cost savings. We omitted indirect worker productivity costs from our analysis as they would vary greatly based on how much work and which tasks each staff member chooses to perform on a tablet rather than a laptop. For some organizations, these benefits may be even more important than the cost savings.

Users can enjoy a better work experience with the Intel vPro 2 in 1 device because it can run full-featured Microsoft Office applications and other Windows applications, which workers rely on, in tablet mode. iPad and Android tablets do not support these applications natively and offer less capable alternatives. Additionally, iPad and Android tablets do not match the browsing functionality or multi-tasking capabilities of Windows tablets, restricting Web-based productivity or the many tasks that require switching back and forth among multiple applications.

Intel vPro 2 in 1 devices offer superior performance. With specifications like those of the Lenovo ThinkPad Yoga and its 4th Generation Intel Core vPro processor, including up to up to 8 GB total memory and a solid-state drive up to 256 GB,[2] the Intel vPro 2 in 1 device meets the demands of office workloads in both its laptop and tablet modes. These devices also have the long battery life that users demand from their mobile devices. Lenovo advertises up to 8 hours of battery life for the Lenovo ThinkPad Yoga with its standard battery.[3]

Users should get far more day-to-day utility from the 2 in 1 device's Windows 8.1 tablet-mode than they would from an iPad or Android tablet. Figure 7 compares user experience on the two-device combinations versus the Lenovo ThinkPad Yoga, a single Intel vPro 2 in 1 device.

A laptop and a separate consumer tablet	A single Intel vPro 2 in 1 device with both laptop and tablet modes
Two devices, operating systems, and sets of software to juggle	Convenience of a single device with one OS and one set of business software
Runs different local software on laptop and tablet	Runs Windows 8.1 applications in all modes
Runs full local versions of Microsoft Office only on the laptop, while Office software for consumer tablets lacks some features[4]	Runs local full versions of Microsoft Office in all modes
Tablets do not match the performance of laptops on typical office workloads[5]	In laptop or tablet mode, it delivers the performance users need for typical workloads
Users must deal with issues of application management between the two devices[6]	The same applications are available in both modes
Users who create and modify content on two separate devices must manage their business and personal files across those devices[7]	The same files are available in both modes

[2] shop.lenovo.com/us/en/laptops/thinkpad/yoga-series/yoga/
[3] shop.lenovo.com/us/en/laptops/thinkpad/yoga-series/yoga/
[4] See our report that describes the better Office 365 experience you get with an Intel Core processor tablet versus an Apple iPad or Android tablet. www.principledtechnologies.com/Intel/Core_tablet_Office365_0513.pdf
[5] *Ibid*.
[6] We have seen a problem where Microsoft Office Web Apps lack some of the capabilities of Microsoft Office 2013 applications.
[7] While cloud-based services can help users keep their files synchronized, files most typically remain on the device on which the user created them. As workers create, share, and modify content, a single 2 in 1 device can greatly simplify file management.

A laptop and a separate consumer tablet	A single Intel vPro 2 in 1 device with both laptop and tablet modes
You have to be online to be productive with the consumer tablet	Users can work locally while offline with Microsoft Office 2013 and other installed applications
Users have more to carry with two devices and their separate cables, accessories, and peripherals	The device weighs less and has fewer accessories, cables, and peripherals to juggle

Figure 7: User experience comparison for one device instead of two.

THE WINNING SOLUTION: INTEL VPRO 2 IN 1 LENOVO THINKPAD YOGA

Advantages of this new class of device built with business workloads and security in mind

In recent months, the market has seen the emergence of a number of 2 in 1 devices that offer the advantages of a laptop and tablet hybrid for consumers or small businesses, but lack the manageability and security that many organizations require. What sets the Intel vPro 2 in 1 devices apart and boosts their appeal for business use is the business-grade manageability and security that Intel vPro technology makes possible. Figure 8 summarizes the features of one Intel vPro 2 in 1 device, the Lenovo ThinkPad Yoga.

Lenovo ThinkPad Yoga	
2 in 1	• Functions as a laptop with keyboard and touchpad • Functions as a highly mobile Windows 8.1 tablet with touch • Gains desktop capabilities with optional docking station
Intel vPro technology	• Extends IT control with business-grade manageability and security when configured with a 4th Generation Intel Core vPro processor • Remotely manageable so you can monitor and remediate devices remotely regardless of their state with the remote management tools in your management solution • Compatible with the management and security solutions you already have for other Windows 7 or 8 desktop and mobile devices • Improved data protection built-in includes accelerated hardware based authentication, automatic encryption, and antitheft capabilities • Protected launch environment helps keep viruses and malware off your devices and network[8]
Compact and portable design	• Provides high performance with processors such as the 4th Generation Intel Core i5 4300U processor in our model, up to 8 GB of memory, and up to a 256 GB solid-state drive. • Has a thin, sleek, and lightweight design • Advertises 8 hours of battery life with the standard battery • Can be upgraded from HD (1,366 x 768) resolution to FHD (1,920 x 1,080) with a digitizer pen for graphical productivity • Can run Windows and Microsoft Office workloads to boost user productivity • Receives business-class support with Lenovo support plans that offer next business day on-site support and accidental damage protection

Figure 8: Advantages of the Lenovo ThinkPad Yoga.

[8] For more information, see: www.intel.com/content/dam/www/public/us/en/documents/guides/mobile-security-with-intel-core-processors-guide.pdf

Advantages of 4th Generation Intel Core vPro processors

New features of 4th Generation Intel Core vPro processors enhance performance and mobile productivity for workers and strengthen security for IT. They offer faster performance, faster wake up, and improved graphics. Power efficiencies can extend battery life so workers can stay mobile throughout their workday. Turbo boost capabilities can deliver bursts of speeds when tasks need it to keep performance from lagging. Faster hardware-based data encryption can secure information without slowing down work. These enhancements can increase worker productivity and satisfaction.

Other features can help IT manage and secure client systems. Two-factor authentication with Intel Identity Protection Technology (Intel IPT) can help prevent unauthorized access to devices and business data. IT can configure, diagnose, isolate, and repair an unresponsive infected PC using remote support and monitoring capabilities embedded into select Intel vPro processors. These greater IT efficiencies can lower IT costs.[9]

IN CONCLUSION

We estimated costs for an organization to purchase, deploy, manage, and secure a Lenovo ThinkPad Yoga, a 2 in 1 device with an Intel Core processor featuring Intel vPro technology, versus a sub-$1,000 laptop combined with either an iPad or Android tablet. At first blush, one might expect a laptop and a consumer tablet to be cheaper than a Intel vPro 2 in 1 device. That was not true here, even for the devices alone: The Lenovo ThinkPad Yoga device cost less than the combined hardware cost of the laptop device and either consumer tablet. The cost advantages of the Lenovo ThinkPad Yoga became obvious when we added in the costs of the hardware support, consumer tablet replacement costs, and costs to deploy, manage, secure, and support two devices versus one Intel vPro 2 in 1 Lenovo ThinkPad Yoga device with business-grade security. The savings would become even more dramatic if you factored in the costs associated with additional peripheral devices and accessories, and the time employees must spend managing files and content (costs we omitted from our analysis).

For companies that want to provide their workers with tablet devices and for companies that support bring-your-own employee-purchased or BYOD solutions, the benefits of a single 2 in 1 device such as the Intel vPro 2 in 1 Lenovo ThinkPad Yoga are many.

[9] For more information, see www.intel.com/content/www/us/en/processors/vpro/core-processors-with-vpro-technology.html.

APPENDIX A – DETAILED COST ANALYSIS

Scenario summary

Users need both the productivity advantages of a laptop and the portability and multi-touch capabilities of a tablet. The organization considers two options for providing this: (1) purchasing a laptop plus an iPad or Android tablet for each person, and (2) purchasing a single 2 in 1 device for each person. IT would manage and secure the tablets with MDM tools and procedures. This analysis shows the advantages if they choose the second option, purchasing a single 2 in 1 device and managing it with the same tools they use for other laptops in the organization.

What we are comparing

Figure 9 gives information about the four devices included in the three scenarios. For this analysis, we compared the Intel vPro 2 in 1 device in the first column with pairings of the two tablets in the middle and the laptop in the rightmost column. We sourced the information from the Web site of each vendor.

	Intel vPro 2 in 1 device	Apple iPad	Android tablet	Laptop to pair with tablets
Model	Lenovo ThinkPad Yoga[10]	Apple iPad Air[11]	Samsung Galaxy Note 10.1- 2014 Edition[12]	Lenovo ThinkPad T440 Laptop [13]
Description	128GB SSD with Wi-Fi	32GB with Wi-Fi	32GB with Wi-Fi	500GB with Wi-Fi
Processor	Intel Core i5-4300U (1.9GHz w/ Turbo, 3MB Cache) processor	A7 chip with 64-bit architecture and M7 motion coprocessor	Exynos® 1.9GHz Quad processor + 1.3 GHz Quad processor	Intel Core i5-4200U (1.6GHz w/ Turbo, 3MB Cache) processor
Memory	4 GB	1 GB	3 GB	4 GB
Storage	128GB mSATA solid-state drive (SSD)	32GB integrated flash	32GB microSD™	500GB hard disk drive, 7200 RPM
OS	Windows 8.1 Pro 64	iOS 7	Android 4.3, Jelly Bean	Windows 8 Pro 64
Display (inches)	12.5	9.7	10.1	14.1
Resolution	HD (1,366 x 768)	2,048 x 1,536 at 264 PPI	WQXGA (2,560 x 1,600)	HD (1,366 x 768)
Bluetooth® 4.0 wireless technology	Yes	Yes	Yes	Yes
Intel vPro technology	Yes	No	No	No
Weight as advertised; config. might differ	3.46 lb. starting weight	1 lb.	1.19 lb.	4 lb. starting weight

[10] shop.lenovo.com/us/en/laptops/thinkpad/yoga-series/yoga/
[11] www.apple.com/ipad-air/specs/
[12] www.samsung.com/us/mobile/galaxy-tab/SM-P6000ZWVXAR-specs
[13] shop.lenovo.com/us/en/laptops/thinkpad/t-series/t440/

	Intel vPro 2 in 1 device	Apple iPad	Android tablet	Laptop to pair with tablets

Figure 9: Specifications for the four devices on which we base our analysis.

Assumptions

We estimated three-year costs for hardware and hardware support, software to view and edit Microsoft Office documents and spreadsheets on each device, management software costs, and IT costs to deploy, manage, and secure the devices. Below, we present our main assumptions in this analysis.

Hardware

- Each user would need a laptop and a tablet, either separately or combined in a single Intel vPro 2 in 1 device.
- For the laptop to pair with the tablets, the organization would select a base model of a leading business laptop that included or could be configured with Windows 8 Pro, 4 GB of memory, and a 4th generation Intel Core i5 processor that does not support Intel vPro technology. We would remove Fingerprint Readers if these were optional.
- We configured the iPad and Android tablets with 32 GB of storage, assuming users would not store many corporate files on the devices but would instead store them in SharePoint or use a file-sharing service that their laptops can also access. We did not include costs for file sharing.
- We included Windows 8.1 Pro 64 on the Intel vPro 2 in 1 device and, because Windows 8.1 Pro 64 was not an option on the laptop, we selected Windows 8 Pro 64 for it.

Hardware support

- Support plans and corresponding lifecycles are typically three years for laptops. We assumed a three-year lifecycle for the laptop and the Intel vPro 2 in 1 device with its built-for-business tablet. A longer lifecycle reduces the IT costs related to procuring, setting up, and deploying devices.
- Consumer tablets typically have shorter lifecycles than laptops. AppleCare® Plus for the iPad is a two-year policy. This matches what we see as the typical lifecycle of tablets in businesses. In our cost model, we replaced the tablets after two years. We assumed purchase of a tablet at the beginning of the three-year analysis period and of a replacement tablet at the same price at the end of year two; because the life of that replacement tablet would extend a year past our three-year model, we included only half of its price in the model. You would see savings for the 2 in 1 device even without replacement costs for the tablets.

Software

- We assumed each device would need a way to view and edit Microsoft Office documents and included the appropriate software on each device.
    - Software costs for the **laptop plus iPad pair** included a monthly subscription cost for Microsoft Office 365 Midsize Business.[14] This subscription would include the full-featured Office 2013 applications that the user can install on the laptop[15] and would allow use of Office Online. We estimated that the organization would support 250 or fewer users with the chosen solution and selected the Microsoft Office 365 Midsize Business version as the most appropriate version of Microsoft Office 365 for that user count.
    - The **vPro 2 in 1** solution did not require use of Office Online, so for that solution we included the cost of a license to Microsoft Office 2013 Professional.
    - We also used Microsoft Office 2013 Professional for the laptop in the **Android solution** because the Android does not run the Office Online applications well, and Microsoft's other option for mobile Office functionality, the Office Mobile for Office 365 app for Android devices, supports phones, not tablets. For the Android, we assumed the workers would instead install and use a free package such as Quickoffice for Android, which supports viewing and editing of Word, Excel®, and PowerPoint® files.

Management and security

- IT would manage and secure existing Windows laptops with best practices and Microsoft System Center Configuration Manager (SCCM) 2012 SP1, and would use those same tools for the 2 in 1 devices and laptops in this analysis.
- Each user had a Microsoft Enterprise Client Access License (CAL) Suite licensed on a per-user basis. This CAL Suite permits a user's devices to connect to Windows Servers and Microsoft Exchange Servers in the organization and would include SCCM 2012 SP1 support at no extra cost.

[14] office.microsoft.com/en-us/business/office-365-midsize-business-productivity-software-FX103037683.aspx

[15] Office 365 Midsize Business includes a subscription to Office for up to five PCs/Macs per user. Includes desktop versions Word, Excel, PowerPoint, Outlook, OneNote, Publisher, Access, Lync, and InfoPath. For more information, see office.microsoft.com/en-us/business/compare-office-365-for-business-plans-FX102918419.aspx

- IT would manage the iPad or Android tablets with a leading MDM, such as AirWatch Management Suites On Premise Green Management Suite, with a $50 one-time fee per user perpetual license and $10 maintenance costs per user per year,[16] a total of $80 per user over the three-year timeframe of our analysis.

Cost details

Our analysis includes costs for the following: hardware, software, deployment, management and security, and IT support.

Hardware costs

Figure 10 shows the purchase price cost for the four devices. This includes device cost, support costs, and replacement costs for the consumer tablets after two years.

Device costs	Intel vPro 2 in 1 device (Lenovo ThinkPad Yoga)	Apple iPad Air	Android tablet (Samsung Galaxy Note 10.1- 2014 Edition)	Lenovo ThinkPad T440 Laptop
Device cost	$1,269.00	$599.00	$549.99	$975.92
Hardware support including accidental damage protection (three years for laptops, two years for tablets)	$299.00	$99.00	$124.99	$222.00
Replacement cost of consumer tablets after two years (half of two-year cost)	N/A	$299.50	$275.00	N/A
Hardware support for tablet replacement (half of two-year cost)	N/A	$49.50	$62.50	N/A
Hardware subtotal	$1,568.00	$1,047.00	$1,012.48	$1,197.92
Source	Lenovo Web site: 2/21/14	Apple and SquareTrade Web sites: 2/21/14	Samsung and SquareTrade Web sites: 2/21/14 with in-cart discount for the tablet	Lenovo Web site: 2/11/14 with in-cart discounts

Figure 10: Hardware costs for the four devices.

- **Device cost.** We wanted to compare recent models for the laptop and the Intel vPro 2 in 1 device, so we chose both equipped with 4th generation Intel Core i5 Processors. For the laptop, we selected the Lenovo ThinkPad T440 Laptop from the popular Lenovo T-series.
  - To get the price of the **Lenovo ThinkPad T440 Laptop,** we started with the base model in the Lenovo online store and customized it with an Intel Core i5-4200U processor and Windows 8.0 Pro 64. We

[16] www.air-watch.com/pricing

deleted the Fingerprint Reader the model included. We used the price after in-cart discounts.

  - We chose the **Lenovo ThinkPad Yoga** multimode business device in the Lenovo store and customized it with Windows 8.1 Pro 64 and an Intel Core i5 vPro processor. Lenovo did not offer any discounts for this configuration.
  - For the two **consumer tablets**, we chose 32GB Wi-Fi-only models from the vendor's Web sites. We used the price for the Samsung after in-cart discounts. The Apple site did not offer discounts for the iPad Air.

- **Replacement costs of tablets after two years**. We assumed a three-year life cycle for laptops and a two-year life cycle for tablets. To cover costs for the third year in our model, we added half the price of a replacement tablet after two years for each tablet device. We assumed the total replacement tablet cost is the same as the original tablet.
- **Hardware support.** We selected three-year support plans with accidental damage protection for the laptop and 2 in 1 devices. For the **Lenovo devices**, we added the three-year support plan with accidental damage protection. The Lenovo Store site offered one such plan for each device, though the two were different, 3YR Depot/CCI + Accidental Damage Protection for the 2 in 1 and 3YR Onsite + Accidental Damage Protection for the laptop. We used the discounted pricing. We selected two-year support plans for the **consumer tablets**. For both the iPad and Android tablets, we used the SquareTrade two-year protection plan price. We selected a tablet protection plan for the Android based on the device's price. This plan includes accidental damage protection. We selected the SquareTrade iPad protection plan for the iPad. We selected the option that did not include an added per-incident cost for the iPad. For all of the support, we used values after in-cart discounts if offered.
- **Replacement tablet support.** For the third year of the pricing model, we add in half the price of two-year support to cover the first year of usage for the replacement tablet.

Figure 11 shows the hardware costs calculated for the three solutions we compared. The middle and right columns show the cost for the tablet plus the laptop. In this analysis, the Intel vPro 2 in 1 device saved on hardware costs over the two-device options.

	Intel vPro 2 in 1 Lenovo ThinkPad Yoga	Apple iPad Air plus Lenovo ThinkPad T440 Laptop	Samsung Galaxy Note 10.1 plus Lenovo ThinkPad T440 Laptop
Hardware costs	$1,568.00	$2,244.92	$2,210.40

Figure 11: Total hardware costs over three years for the three solutions we compared.

Software costs

For the three options, we included the three-year cost of software to view and edit Microsoft Office documents and spreadsheets and management software. Figure 12 shows the costs.

Software	Intel vPro 2 in 1 Lenovo ThinkPad Yoga	Apple iPad Air plus a Lenovo ThinkPad T440 Laptop	Samsung Galaxy Note 10.1 plus a Lenovo ThinkPad T440 Laptop
Microsoft Office 2013	$399.99	N/A	$399.99
Microsoft Office 365 Midsize Business	N/A	$540.00	N/A
Free Quickoffice for Android tablets	N/A	N/A	$0.00
MDM for tablet management ($80 per user over three years)	N/A	$80.00	$80.00
Software subtotal	**$399.99**	**$620.00**	**$479.99**

Figure 12: Software costs over three years for the three solutions we are comparing.

We included the following software costs:

- **Microsoft Office 365.** For the laptop plus iPad solution, we included a three-year subscription to Microsoft Office 365 for Midsize Business. The per-user subscription allows a local install of Microsoft Office applications on the laptop and includes rights to run Microsoft Office Online, the cloud-based Microsoft Office suite, via browsers on additional devices, such as the iPad in this analysis or a smartphone. Office Online is Microsoft's recently released rebranded version of its Office Web Apps. Key applications in Office Online include Word Online, Excel Online, PowerPoint Online, and an online version of Outlook. The Office Online applications lack some of the features of desktop versions of Microsoft Office applications, so users in our scenarios would have a more robust Office experience running Microsoft Office applications locally on the laptop than running the Office Online

applications on the iPad tablet.[17]

- **Microsoft Office 2013.** We included the licensing cost for a local install of Microsoft Office Professional 2013 for the vPro 2 in 1 device and the laptop plus Android solutions, neither of which will use Office Online. The 2 in 1 device does not need to run the Office Online applications because both its laptop and tablet modes work well with the local install of Microsoft Office 2013.
- **App on Android tablet.** For the Android tablet, we did not include the Office Online because we had little success in running the Office Web Apps on Android tablets in our hands-on testing in June 2013. The apps were acceptable for viewing documents and spreadsheets, but did not support editing on the Android devices. For the Android tablet scenario, we instead gave tablet users some ability to edit Microsoft Office documents by adding a free third-party app, Google Quickoffice. That software, though not fully compatible, offers better compatibility with Microsoft Office 2013 on the laptop than the third-party apps currently available for users wanting to edit Microsoft Word and Excel files on Android devices.

  While software costs for the Android solution were lower than costs for the iPad solution, users would benefit more by running Microsoft Office Online on the iPad.
- **Management software**. We also included the $50 one-time per-user perpetual license fee and annual $10 per user maintenance cost of the top-rated AirWatch MDM to manage the tablet devices.

Deployment costs

We included the staff cost to deploy all the devices at the start of the three-year model and to deploy a replacement tablet after two years (see Figure 13).

Deployment	Intel vPro 2 in 1 Lenovo ThinkPad Yoga	Apple iPad Air plus a Lenovo ThinkPad T440 Laptop	Samsung Galaxy Note 10.1 plus a Lenovo ThinkPad T440 Laptop
Tablet deployment	N/A	$40.00	$40.00
Replacement tablet deployment cost	N/A	$40.00	$40.00
Laptop deployment	$72.00	$80.00	$80.00
Total deployment	**$72.00**	**$160.00**	**$160.00**

Figure 13: IT staff costs over three-years to deploy the three solutions we compared.

[17] See our report that describes the better Office 365 experience you get with an Intel Core processor tablet vs. an Apple iPad or Android tablet www.principledtechnologies.com/Intel/Core_tablet_Office365_0513.pdf

We estimated costs to deploy a conventional laptop with Windows 8 Pro at $80 per user, and put the cost of a 2 in 1 device with Intel Core vPro processor at 10 percent lower based on the better remote manageability features of the Intel Core vPro processor. For the iPad and Android tablets, we included the costs to deploy the original tablet and a replacement tablet two years later, with each deployment costing $40 per device. The deployment costs for the consumer tablets is lower than that of the laptops because laptop deployment includes local installs of Microsoft Office software.

Management and security costs

Figure 14 summarizes costs to manage and secure the devices. We assumed one IT full-time employee (FTE) could manage and secure 500 Lenovo ThinkPad T440 Laptops (or other laptops not enabled with Intel vPro technology) at a cost of $468.24.[18] Compared to the base cost of managing Lenovo ThinkPad T440 Laptops,

- We estimated that IT costs could be 10 percent lower managing an Intel vPro-enabled laptop such as the Lenovo ThinkPad Yoga.
- We expected IT costs could be 20 percent lower managing iPad tablets. See our reasoning in the following section.
- We expected IT costs to be 30 percent higher managing Android tablets, which have fewer business capabilities and are more consumer oriented.

Management and security	Intel vPro 2 in 1 Lenovo ThinkPad Yoga	Apple iPad Air	Android tablet (Samsung Galaxy Note 10.1- 2014 Edition)	Lenovo ThinkPad T440 Laptop
Management and security costs	$421.42	$374.59	$608.71	$468.24
Devices per FTE	556	625	385	500

Figure 14: Management and security costs over three years for the devices in our analysis.

Figure 15 shows the management and security costs calculated for the three solutions we compared. The two columns at right show costs for the laptop plus the tablet.

	Intel vPro 2 in 1 Lenovo ThinkPad Yoga	Apple iPad Air plus a Lenovo ThinkPad T440 Laptop	Samsung Galaxy Note 10.1 plus a Lenovo ThinkPad T440 Laptop
Management and security costs	$421.42	$842.83	$1,076.95

Figure 15: Management and security costs over three years for the solutions we compared.

[18] To get average staff cost for each device, we used average total compensation (salary and benefits) for System Administrator I of $78,039 from Salary.com as of January 27, 2014, divided by the 500 devices each staffer could support, and multiplied by three years.

Why a non-PC tablet can cost less to manage

The same features that make non-PC tablets less capable for business can also make them easier to manage and secure. Because non-PC tablets have fewer moving parts and run more as a thin client than a PC for many office tasks, they should theoretically be easier to manage and secure than a PC tablet. We found this to be true for iPads but much less so for Android tablets.

The iPad is designed to be easy on the management budget. Apple locks down the hardware and OS software and vets apps. This has the effect of reducing the role of IT in managing the device and the apps on it and consequently the cost to manage and secure the iPad. IT does not manage or secure the iPad at the BIOS or OS level as it does on PCs because those levels are not accessible on the iPad. IT does not need to debug problems with application interactions because apps run in isolation. IT cannot secure ports that are not there. IT does not need to debug problems with mice or monitors because the iPad does not connect to them. Apple provides a single source for all updates and vets the updates so IT does not have to hunt down updates at the various hardware and software sites as it does with PCs and does not have to debug interactions among those updates. All of this leads to lower management costs.

The iPad is a tablet, not a tablet PC. It does not run Windows software locally, only remotely, operating as a thin client to run hosted software, accessing PC software over the cloud, or running Web-based versions of the software. In our scenario, the users would want to view and edit Microsoft Office documents and spreadsheets on the tablets. We assumed they would run Office Online on the iPad. Software run remotely moves related management problems and solutions away from the device to the server or cloud and saves on device-specific management costs.

These benefits come at a cost. The iPad trades manageability for user productivity. Many of the aspects of the iPad that make it more manageable also limit user productivity. The iPad hardware is less complicated than a tablet PC hardware, but also less capable for some tasks. iPad hardware runs its own local apps, but it is not a match for complex tasks of Microsoft Word, Excel, and Outlook. Users must connect to a Wi-Fi or cellular network to be productive with remote software, while users with full versions of Office 2013 can work while unconnected. The iPad gains on manageability because it has fewer connections to manage, but as a result, a user cannot connect to a keyboard, mouse, and monitor that could improve their productivity working with Office programs. The product direction by Apple concerning apps and features can mean users cannot access Flash or download tools they need to access features on some Web sites. We did not calculate a user productivity cost in this analysis.

Google has a more open approach to Android tablet devices and apps, giving users and IT more flexibility but consequently raising management costs and security risks. In April 2013, Symantec™ reported that more malware threats targeted Android than Apple devices.[19] Most of these came from apps downloaded from third-party sources, something Apple does not support.

Malware is not the only problem. The Android security architecture has lagged behind that of Apple. OS updates are at each hardware vendor's discretion, so there is no guarantee that a device will benefit from OS improvements over time. Also, each vendor can create its own OS version, which can complicate MDM selection. Differences such as these, which affect the amount of time and effort IT must take to manage and secure the devices, account for the higher costs we show for Android management and security. Google has somewhat narrowed that gap with the latest Android 4.3 Jelly Bean operating system on the Samsung Galaxy Note 10.1 tablet, which comes with additional business-grade manageability features and with enhancements in newer versions of third party MDM products that improve manageability and security of the Android devices.

IT support costs

Figure 16 shows the IT support costs for the solutions we compared. For the Windows 8 Pro laptop, we estimated IT support costs as one help desk call per year per device for an average cost of $40 per year. We estimated an average annual IT repair cost of $6 based on an assumption that 3 percent of systems would need repair at a cost of $200 per device. Finally, we estimated a cost for in-house labor related to accidental breakage of $11.26 per year based on the assumption that 10 percent of systems per year suffer some breakage requiring three hours of staff time. These costs total $171.78 over three years. We used the same multipliers as for management and security to calculate IT support costs for the other devices because the same device limitations and management tool capabilities that influence IT's ability to perform management and security tasks also affect support tasks.

IT support	Intel vPro 2 in 1 Lenovo ThinkPad Yoga	Apple iPad Air plus a Lenovo ThinkPad T440 Laptop	Samsung Galaxy Note 10.1 plus a Lenovo ThinkPad T440 Laptop
Tablet IT support	N/A	$144.18	$213.18
2 in 1 device and laptop IT support	$157.98	$171.78	$171.78
IT support subtotal	**$157.98**	**$315.96**	**$384.96**

Figure 16: IT support costs over three years for the solutions we compared.

[19] www.techcrunch.com/2013/04/16/symantec-mobile-malware/

Additional advantages we did not quantify

The Intel vPro 2 in 1 device could offer more savings in the areas of user productivity benefits and security cost avoidance. It could deliver savings related to user productivity because users can perform a broader range of tasks with the Intel vPro 2 in 1 device in tablet mode than they can with an iPad or Android tablet. The built-in security of this platform could help organizations reduce costs associated with security breaches. This savings potential varies from industry to industry as regulatory requirements and penalties differ.

APPENDIX B – BUSINESS VALUE OF LENOVO THINKPAD YOGA

Organizations do not base buying decisions solely on cost. In addition to saving money, the Intel vPro 2 in 1 Lenovo ThinkPad Yoga also provides a better experience for workers compared to a separate laptop and tablet devices.

Better experience for users

The Lenovo ThinkPad Yoga gives users the convenience of a laptop and tablet in one: a capable laptop and, most crucially, a tablet to perform everyday tasks.

A tablet that performs office tasks

If users only want to check email, do light Web browsing, and view online videos of a company or school, almost any tablet will do. However, to perform a broad range of tasks, they need a tablet that can open and edit Microsoft Office files and provide a rich browsing experience—areas in which Windows 8 tablets excel. The Lenovo ThinkPad Yoga adds value and convenience by combining a Windows 8 laptop and Windows 8 tablet in one device. With its 4th generation Intel Core vPro processor, up to 8 GB of memory, and up to 256GB mSATA SSDs, this Intel vPro 2 in 1 device can handle a robust workload. It has these key advantages:

- **Performance.** 2 in 1 Intel vPro devices can handle most business and education usage scenarios. iPad and Android tablets, with their less capable processors and lower memory capacity, cannot match the performance of the laptop we pair them with or the Intel vPro 2 in 1 device.
- **Microsoft Office compatibility.** Microsoft Office is the leading software in business and education, and other Windows applications drive many other functions. In our comparison here, users have the advantage of running full-featured Microsoft Office applications running Microsoft Office 2013 on the Lenovo ThinkPad Yoga and the laptop. They are faced with more limited feature sets when they run the Office Online applications on the Apple iPad or Quickoffice on the Android tablet. The Microsoft Office Online available with Office 365 provides a good experience on the iPad, but in our tests

with the Office Web Apps (as these applications were known prior to their rebranding as Office Online), they could not match the capabilities or performance of Microsoft Office 2013 on a Windows 8 tablet. Microsoft provides another option for the iPad users – Office Mobile for iPhone, which also runs on iPad devices. It also requires a qualifying Office 365 subscription. Microsoft Office Online applications do not currently provide editing capability on Android tablets, and Microsoft has not released Office Mobile for these tablets. Popular editors for Android tablets—such as Quickoffice, Polaris Office, and the CloudOn service—lag in performance, capability, and compatibility with Office 2013.

- **Fully capable browser.** In our experience, the Windows 8 Pro tablets offer a superior browsing experience to that of iPad and Android tablets. With nearly a fifth of sites including Flash components,[20] lack of support for Flash on the iPad browsers and some Android devices limits the utility of those browsers. In tests in our labs, we experienced other frustrating lapses and performance lags using popular browsers on iPad and Android devices. Based on these comparisons of Web browser features and performance, we ranked Windows 8 browsers higher than the browsers we tested on iPad and Android tablets.
- **Connectivity.** Users need devices that can connect to other devices, to mice, to monitors, and to the file servers of a business. Intel vPro 2 in 1 devices offer a variety of connectivity options via ports on the tablet and often more ports on docks, letting users connect to a variety of devices and to multiple devices at once. Fewer connectors on the iPad and many Android tablets limit their connectivity. They lack sufficient ports to connect to both a physical keyboard and a mouse, a combination many users rely on for input. Some Android tablets support older Bluetooth standards—3.0 instead of 4.0—so connection to all modern Bluetooth devices is not possible.
- **Worker productivity.** The fast startup and response times and long battery life of the 2 in 1 device should improve productivity compared to less-capable laptops. Workers can be more productive with one Intel vPro 2 in 1 device that runs the same capable Microsoft Office and browser software in tablet and laptop mode than they could by switching between different software packages on separate laptop and tablet devices.

[20] W3Techs provides information about the usage of various types of technologies on the Web and reports that, though Flash use is decreasing, 19.4 percent of sites still use it as of April 30, 2013. www.w3techs.com/technologies/details/cp-flash/all/all

- **Tablet utility for business and other organizations.** Non-Windows tablets have less utility than a Windows 8 tablet such as the Lenovo ThinkPad Yoga In our experience, typical usage of non-Windows tablets focuses on email, calendars, document viewers, time tracking, and Web browsing, with the possible addition of custom apps, online customer demos, and apps that provide remote access to files, such as VPN and SharePoint.

  A Windows tablet such as the Lenovo ThinkPad Yoga can save the organization the cost of migrating existing in-house Windows applications and Web-based apps to run on other tablet OSs and browsers. Workers in large organizations likely have access to and rely on a variety of Windows applications or Web apps developed in-house and customized to their organization for tracking time, reserving space or resources, scheduling events or classes, demonstrating products, and carrying out other day-to-day tasks. These Windows 8-compatible tools and Windows 8 browser-compatible apps should run as-is on an Intel vPro 2 in 1 device in tablet mode. However, the Windows tools will not run locally on the iPad and Android tablet, and the Web apps may fail on those tablets due to browser incompatibilities. The workarounds to this situation are less than ideal: workers do without useful in-house software tools on their non-PC tablets, workers run them inefficiently over a remote Windows connection, or the organization incurs the (often large) cost of converting these tools to run on other tablet OSs and browsers.

  Because they support the applications users need to do their work, Windows 8 tablets should deliver better value than non-Windows tablets.

The convenience of one device instead of two

The Lenovo ThinkPad Yoga transforms on the fly. You can use it in clamshell mode for editing a document at your desk with the keyboard and touchpad, or rotate the keyboard to switch to tablet mode and touch interface for uses such as checking a calendar in a meeting or showing a video to a client. It also offers a stand mode and a tent mode for presentations. The Lenovo ThinkPad Yoga offers additional features such as an optional dock to connect monitors and other peripherals.

In addition, the Lenovo ThinkPad Yoga offers these benefits over two-device solutions:

- **Lighter.** The Lenovo ThinkPad Yoga starts at 3.46 lbs. That is less than the combined weight of a laptop and consumer tablet. When you add the

weight of power supplies and other accessories, the Intel vPro 2 in 1 device is even lighter by comparison.

- **More energy efficient.** Users have one device instead of two to find outlets for and charge.
- **Less clutter.** One device means fewer power cords, peripherals, and accessories to locate.
- **Less accessory duplication.** Users need a case, peripherals, and accessories for only one device.
- **Less software duplication.** Unlike devices with different OSs, which may be able to share cloud, Web, and hosted software but need different local software, the Intel vPro 2 in 1 device uses a single set of applications.
- **Less software to learn.** Software works the same in laptop and tablet mode, with the only difference being whether you use touch-only interaction.
- **Easier to manage content and applications.** With one device, you don't need to remember which files are on which device, and the software and files you need are always with you.

With the Intel vPro 2 in 1 Lenovo ThinkPad Yoga, users get the convenience of only one device to learn to use. They decide which mode to use for a task rather than which device to use. It should be easier for a user to move smoothly between a tablet on the go and a laptop at the desk when one device with one OS and common software can do the work of both.

2 in 1 devices, such as Lenovo ThinkPad Yoga, with Windows 8.1 Pro and Intel vPro technology are easier to manage, secure, and support

Intel vPro 2 in 1 devices are built with features that make them easier and less costly to manage, secure, and support than conventional laptops. Windows 8.1 Pro and 4th generation Intel Core vPro processors add enhanced security features and give IT more flexibility and control to manage the devices. Cases are constructed to withstand everyday use. These devices are backed by OEM support agreements that include on-site repair and fast response. The Intel vPro 2 in 1 device with these features is easier to manage and support than the conventional laptop in the other two options, which we configured with Windows 8 Pro but without Intel vPro; they save even more when compared to the cost to manage both the laptop and either an iPad or Android tablet.

Business-grade management and security deliver value for IT

Windows 8 Pro devices can join a Windows domain and access the Active Directory resource, both of which are needed for a managed Windows environment. Intel vPro technology provides enhanced security built into the chip and works with your security and management software.

Business-grade manageability and security on Intel vPro 2 in 1 devices can deliver savings and benefits in the following areas:

- **Secure enough for regulated industries.** Most organizations want to secure devices and the critical data they can access. Some are subject to government and industrial regulations that require specific security protections. Management software can work with Windows 8 Pro and Intel vPro technology to help IT meet these security needs:
    - **Full-disk encryption.** Regulatory requirements for some industries, such as healthcare and finance, levy penalties or fines if devices that lack full-disk encryption are lost or stolen. Windows 8 Pro systems support full-disk encryption using either Microsoft BitLocker® or a self-encrypting hard drive.
    - **Audit requirements.** These tools can meet government or industry regulations to audit hardware and software.
    - **Malware protection.** Windows 8 Pro provides better protection against malware and threats that could jeopardize compliance with data protection regulations.
    - **Wiping stolen devices.** IT can use management software to locate, disable, and wipe lost or stolen devices that are secured with Intel vPro technologies.
- **Ease of management.** IT can manage and secure Intel vPro 2 in 1 devices with the same tools, such as Microsoft System Center Configuration Manager (SCCM) 2012 SP1, and the same procedures that it uses for other Windows laptops. These Windows management tools may offer only limited support for iPad and Android devices, and the procedures may not work with those devices. To provide robust management of iPad and Android devices, IT would then need to budget for mobile device management (MDM) tools and infrastructure and develop procedures to manage and secure the devices. Smaller organizations that may be using MDM software, rather than SCCM, to manage Windows devices can manage the 2 in 1 devices with that as well. They will not get the same robust set of Windows device management capabilities as they do with SCCM.
- **Remote management.** IT staff can use management tools to take remote control of a Windows 8 Pro device to diagnose and resolve software problems remotely and to roll out security patches. Effective remote management cuts the number and cost of desk-side visits.

- **Business-grade hardware.** Intel vPro 2 in 1 devices are constructed to withstand everyday use by mobile professionals. A durable case reduces the IT break-fix workload and reduces user downtime waiting for repairs. Advanced security features, such as fingerprint readers (on some models) and full-disk encryption capabilities, protect business data and user identities.
- **Business-grade support.** Vendor support agreements can provide next-business-day repairs that are not included in typical support agreements such as AppleCare plus for the iPad or SquareTrade or other (often third-party) plans for Android tablets. Support agreements that include accidental damage protection speed up repairs.

2 in 1 device means one device instead of two to manage, secure, and support

With the Intel vPro 2 in 1 Lenovo ThinkPad Yoga, the biggest benefits for IT ─ and significant savings for business budgets ─ come from having one device instead of two to manage, secure, and support:

- **Less IT workload with a single device**. If IT does not manage and secure any device that can access business applications and data, it risks regulatory penalties or other costs of data loss. Workers also require IT support for any computing device they use for business. Those requirements have IT supporting both the laptop and tablet ─ two devices per user as opposed to one. Only a Intel vPro 2 in 1 device saves the cost of managing a second tablet device for workers who also use a laptop.
- **Saves the MDM-related costs**. With the two-device options, IT usually must pay for and maintain two parallel management and security solutions: the existing Windows management and security tools for the laptop, and separate mobile device management tools for the tablets.
- **Lenovo ThinkPad Yoga Intel vPro 2 in 1 device offers superior security.** The Lenovo ThinkPad Yoga has a robust set of enterprise-ready security features provided by the processor, OS, and hardware. It has the embedded security features of Intel Core vPro processor, which help mitigate threats, protect user identities and credentials, and secure data. Windows 8.1 Pro, the OS on the Lenovo ThinkPad Yoga in this analysis, adds security protection though features such as expanded device encryption. These features add up to more robust security than you get with either laptop plus tablet solution. The laptop does not offer vPro protections making it a less secure option than the vPro-enabled 2 in 1 device. The iPad, though it offers some security capabilities such as

remote wipe of stolen devices, encryption support, and "Find My iPad" feature, doesn't have the same level of enterprise security as the Intel vPro 2 in 1 device. Android tablets are typically more consumer-focused and lacking in business-grade security, so they provide less security than the laptop plus iPad solution and much less security than the Intel vPro 2 in 1 option.

Intel vPro 2 in 1 devices are a win for IT with manageability, security, and durability advantages over conventional laptops and even more so over the combination of a conventional laptop and an Android or iPad tablet.

Two devices in one saves costs of managing a separate tablet

The biggest benefit for IT and significant savings for the business, government, or school comes from supporting one device instead of two for each worker. A single Intel vPro 2 in 1 device instead of a laptop plus an iPad or Android tablet eliminates the costs of deploying, managing, securing, and supporting stand-alone tablets and can deliver savings throughout the lifecycle of the device.

- **Procurement.** IT needs to procure only one-third the number of devices during the three-year span of our analysis. In our analysis, we compared the purchase of one Intel vPro 2 in 1 device to three devices in the other two models – a laptop and a consumer tablet both purchased at the outset plus a replacement tablet procured at the end of the two-year lifecycle of the initial consumer tablet. We assumed a typical three-year lifecycle for the laptop and Lenovo ThinkPad Yoga so they did not need replacement during the three-year period of the analysis.
- **Hardware support agreements.** Organizations pay for vendor support and accidental damage protection for only one device per user.
- **Software purchase.** Organizations save the costs of tablet software.
- **Management software.** IT can manage the Intel vPro 2 in 1 device as they would other mobile PCs, so they can avoid paying for mobile device management software geared to Apple iPad and Android tablets, or developing and maintaining separate procedures for managing tablets.
- **Application development.** Many organizations have developed custom applications that run on Windows PCs, including the Lenovo ThinkPad Yoga tablet, but not on the iPad or Android tablets. The 2 in 1 solution saves organizations the high costs of migrating applications to iOS or Android OSs.
- **Deployment.** IT has fewer devices to set up and deploy to users.
- **Training.** Users need to learn how to use one device, not two.

- **Management and security.** IT has fewer devices to update, debug, and secure.
- **Software tracking.** IT has fewer software packages to track to ensure compliance with vendor agreements.
- **Device failures.** Fewer devices likely mean fewer repairs.
- **Theft.** IT has fewer devices to set up with tracking software so they can be found if lost or stolen.
- **Help desk support.** Support staff has fewer devices to learn and support.
- **Disposal**. There are fewer devices to dispose of at the end of their lifecycle.

ABOUT PRINCIPLED TECHNOLOGIES

Principled Technologies, Inc.
1007 Slater Road, Suite 300
Durham, NC, 27703
www.principledtechnologies.com

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