UPGRADING LAPTOPS AND DESKTOPS TO THE NEW HP ELITEBOOK FOLIO 9470M AND HP ELITEDESK 800 G1 DESKTOP MINI BUSINESS PC

Get a faster, more responsive experience
by replacing your older desktop or notebook

Faster to complete everyday tasks

Better graphics performance

Faster general system performance

Space-saving design

1.3X the battery life

HP EliteDesk 800 G1 mini
versus HP Compaq 8000 Elite

HP EliteBook 9470m
versus HP EliteBook 8460p

Laptops and desktops that were once top-of-the line have been eclipsed by new technologies that can boost performance and speed up employee processes. Letting your employees' work lag behind on older systems can waste precious time that they could spend getting more work done.

In the Principled Technologies labs, we did a series of hands-on tests to show how you could benefit from upgrading an older HP EliteBook 8460p laptop to a new Intel® Core™ i7-3687U processor-powered HP EliteBook Folio 9470m and an older HP Compaq 8000 Elite desktop PC to a new Intel Core i7-4765T processor-based HP EliteDesk 800 G1 Desktop Mini Business PC.

The results were clear. Not only does the new HP EliteDesk 800 G1 Desktop Mini come in a small form factor, which saves space, it also completed tasks such as booting 33.8 percent faster and got an HDXPRT (which assesses digital media performance) score 85.0 percent higher than the older desktop. The new HP EliteBook Folio 9470m laptop also outperformed its legacy system in tasks such as booting in 40.1 percent less time and lasted up to 1 hour 26 minutes longer on a single battery charge.

When employees complete these types of task day in and day out, company-wide, the time savings and productivity boost you get by upgrading systems across your organization can be dramatic.

IT ALL ADDS UP TO AN UPGRADE

Even laptops and desktops that have served you well eventually need to be replaced. By upgrading to new systems, you can save employees time on tasks they complete every day. We found that the new HP EliteBook Folio 9470m laptop and HP EliteDesk 800 G1 Desktop Mini (DM) were good targets to upgrade to, as they shaved time off of most tasks and showed better overall system performance compared to the older HP EliteBook 8460p and HP Compaq 8000 Elite Desktop PC. Upgrading to these systems has the potential to increase productivity, which can help your bottom line.

We compared the systems to their legacy counterparts on tasks that workers do every day—often several times. We also used industry-standard benchmarks to gauge system performance and measure the battery life of the laptops we tested. Here's how we compared them:

- Everyday tasks
- Graphics performance
- General system performance
- Battery life

To see how much better the new Intel Core i7 processor-based systems fared, continue reading. For a look at the benchmarks we used, see Appendix A. See Appendix B for detailed system configurations and Appendix C for the steps we took for testing.

TIME TO COMPLETE EVERYDAY TASKS

Time to boot

A system that boots quickly helps users get to work quicker. In our tests, the new desktop and new laptop systems booted more quickly than the previous-generation systems—up to 41.0 percent more quickly (see Figure 1).
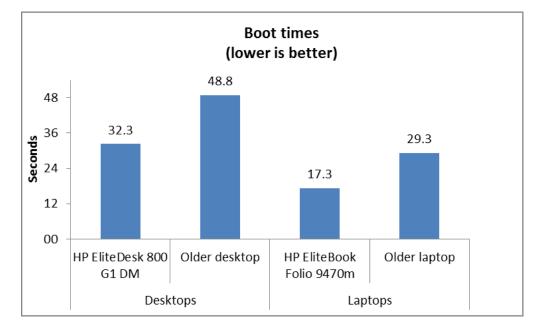
Figure 1: Time the four test systems needed to boot. Lower times are better.

Boot times
(lower is better)

System	Seconds
HP EliteDesk 800 G1 DM	32.3
Older desktop	48.8
HP EliteBook Folio 9470m	17.3
Older laptop	29.3

Time to open Adobe Photoshop Elements 12 and convert a project to JPEG

Adobe® Photoshop® Elements is a powerful application that can take a while to launch and to convert a project from one format to another. In our tests, the two new systems took less time to perform both of these tasks than the previous-generation systems did (see Figure 2).
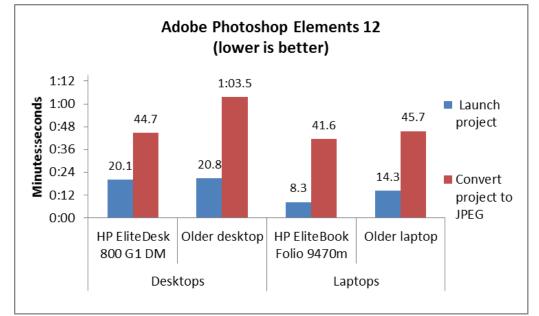
Figure 2: Time the four test systems needed to launch an Adobe Photoshop Elements 12 project and convert it to JPEG. Lower times are better.

Time to open Adobe Premiere Elements 12 and encode a file to MPEG

Adobe Premiere® Elements is another application that can take a while to launch. When done many times a day, this can eat into a worker's productivity. In our tests, the two new systems took less time to launch and encode a file than the previous-generation systems did (see Figure 3). The biggest wins were in encoding a project to MPEG. The new desktop system did this in less than one-third the time of the older desktop system and the new laptop saved almost one minute.
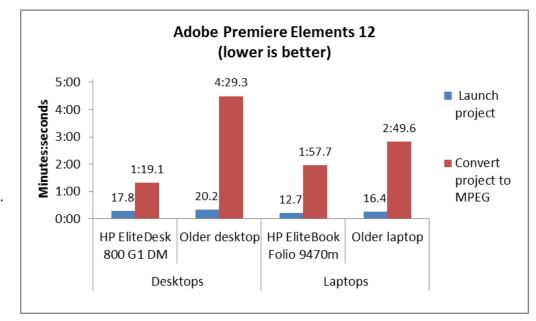
Figure 3: Time the four test systems needed to launch an Adobe Premiere Elements 12 project and encode it to MPEG. Lower times are better.

MEASURING GRAPHICS PERFORMANCE
Futuremark 3DMark Vantage v1.1.2

A system's graphics performance is critical to those who work with graphics programs, but can also effect general responsiveness for those who don't. We used the industry-standard Futuremark® 3DMark® Vantage 1.1.0 benchmark to measure the graphics performance of the four systems we tested. We ran 3DMark Vantage with the Performance preset, which runs at 1,280 x 1,024 and is designed for mid-range hardware. In our tests, the new systems outperformed their previous-generation counterparts across the board (see Figure 4).
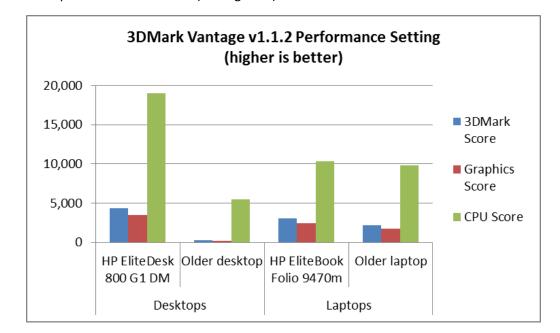

Figure 4: 3DMark Vantage v1.1.2 Performance Setting scores the four test systems achieved. Higher scores are better.

MEASURING SYSTEM PERFORMANCE

Digital media performance

Many folks rely on their desktop and laptop systems to handle digital media. We used the HDXPRT benchmark to see how well our four systems perform such tasks as organizing and editing photos, videos and music. Figure 5 shows the overall HDXPRT Create HD Score for the four systems. The newer desktop and laptop achieved scores 85.0 percent and 51.2 percent better than their previous-generation counterparts, indicating they would be better able to meet a number of media creation and manipulation demands.
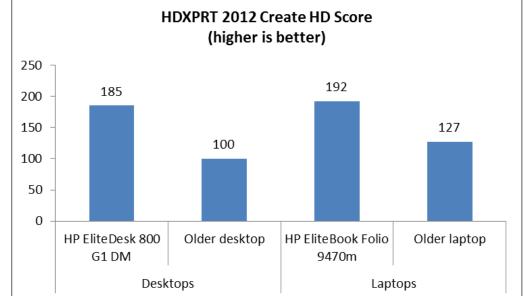
Figure 5: HDXPRT 2012 scores the four test systems achieved. Higher scores are better.

Overall system performance

BAPCo® SYSmark® 2012 tests the performance of systems in a number of areas of business use to determine overall performance. As Figure 6 shows, the new HP EliteDesk 800 G1 outperformed the older desktop system by 94.0 percent and the new HP EliteBook Folio 9470m outperformed the older laptop by 20.0 percent.
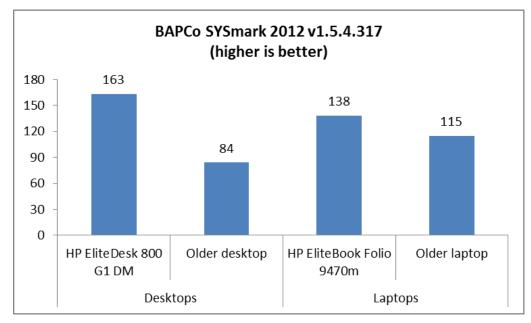
BAPCo SYSmark 2012 v1.5.4.317
(higher is better)

Figure 6: BAPCo SYSmark 2012 scores the four test systems achieved. Higher scores are better.

Futuremark PCMark 7 Advanced v1.4.0

Futuremark PCMark® 7 Advanced is another system performance test that covers storage, computation, image and video manipulation, Web browsing, and gaming. As Figure 7 shows, The HP EliteDesk 800 G1 achieved a 61.3 percent higher score than the legacy desktop, and the HP EliteBook Folio 9470m scored 110.3 percent better than the older laptop.
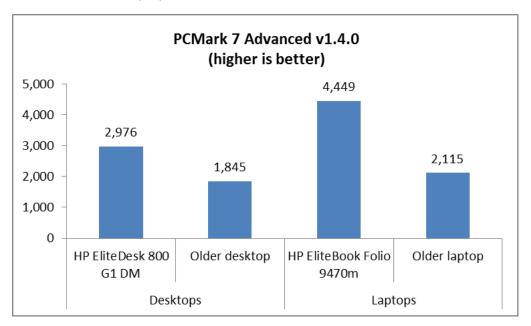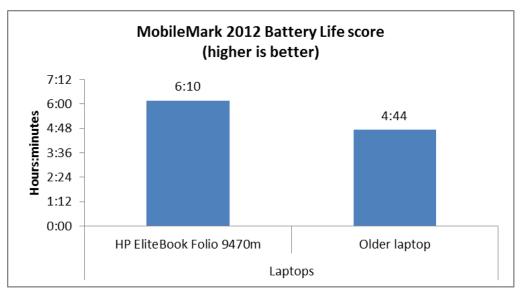
PCMark 7 Advanced v1.4.0
(higher is better)

Figure 7: PCMark 7 Advanced scores the four test systems achieved. Higher scores are better.

MEASURING BATTERY LIFE (LAPTOPS ONLY)

Measuring battery life with BAPCo MobileMark 2012

Laptops with long battery life are ideal for today's worker, who is often mobile. If a laptop runs longer without charge, employees aren't faced with the hassles of plugging in on the go.

We compared the battery life of the two laptops using MobileMark® and found that the new HP EliteBook Folio 9470m lasted one hour 26 minutes longer on a single charge than the legacy system did (see Figure 8).

Figure 8: MobileMark 2012 Battery Life scores the two test laptops achieved. Higher scores are better.

CONCLUSION

Upgrading from older laptops and desktops to newer ones can save employees time on a number of tasks, which can really add up over the course of the workday, the week, and even the year.

We found that the HP EliteBook Folio 9470m laptop delivered 30.3 percent longer battery life than a legacy system and also performed most common tasks more quickly, which would save workers time. Similarly, the HP EliteDesk 800 G1 Desktop Mini improved upon an older system in most common worker tasks, including converting a file to an MPEG in less than one-third the time. This means that for workers who do similar tasks, upgrading to an HP EliteBook Folio 9470m laptop or HP EliteDesk 800 G1 Desktop Mini could reduce wait time and increase productivity.

APPENDIX A - THE BENCHMARKS WE USED

In this section, we present a brief overview of the benchmarks we used in our testing.

Futuremark 3DMark Vantage

Futuremark 3DMark Vantage is a benchmark designed to rate the performance of DirectX® 10 gaming PCs. It includes two graphics tests, two CPU tests, and six feature tests. The benchmark reports both graphics and CPU scores, as well as an overall 3DMark score to rate overall gaming performance.

For more information on 3DMark Vantage, see www.3dmark.com/3dmarkvantage/.

HDXPRT 2012

The High Definition eXperience & Performance Ratings Test (HDXPRT) 2012 is a benchmark that evaluates the capabilities of PCs in consumer digital media uses, including

- Media Organizer
- Media Creator
- Photo Blogger
- Video Producer
- Music Maker

For more information on HDXPRT 2012, see www.hdxprt.com.

BAPCo SYSmark 2012

BAPCo SYSmark 2012 is an application-based benchmark that tests performance in the following office workload scenarios: office productivity, media creation, Web development, data/financial analysis, 3D modeling, and system management. SYSmark 2012 records the time the system takes to complete each individual operation in each scenario. For more information on this benchmark, see www.bapco.com/products/sysmark2012/.

Futuremark PCMark 7 Advanced

Futuremark PCMark 7 includes seven PC tests for Windows® 7 and Windows 8 combining more than 25 individual workloads covering storage, computation, image and video manipulation, Web browsing, and gaming. Specifically designed to cover the full range of PC hardware from netbooks and tablets to notebooks and desktops, PCMark 7 offers complete PC performance testing for Windows 7 and Windows 8 for home and business use. For more information on this benchmark, see www.pcmark.com/benchmarks/pcmark7/.

BAPCo MobileMark 2012

MobileMark 2012 is an industry-standard benchmark that provides a battery life rating and a performance rating based on common office scenarios. In our tests, we focus solely on the battery life rating. MobileMark 2012 applications and workloads specific to mobile systems. These include office activities like file and document management, data processing, and rich content creation. This module provides a score for battery life of the tested applications.

MobileMark 2012 includes the following applications with their corresponding tasks:

- ABBYY® FineReader™ Pro 11
- Adobe Acrobat® Pro X
- Adobe Flash® Player 11
- Adobe Photoshop CS5 Extended 12.04
- Adobe Photoshop Elements 10
- Adobe Premiere® Pro CS 5.5
- CyberLink® PowerDVD® Ultra 11
- Microsoft® Excel® 2010 SP1
- Microsoft Internet Explorer® 9
- Microsoft Outlook® 2010 SP1
- Microsoft PowerPoint® 2010 SP1
- Microsoft Windows Media® Player
- Microsoft Word 2010 SP1
- Mozilla® Firefox® 10.0.2
- WinZip® Pro 16

MobileMark 2012 measures system battery life in minutes. It records system battery life at the start of the benchmark and repeats the workload until the system battery life is depleted, or until the system powers down due to low battery life.

MobileMark 2012 records a timestamp once per minute. At the end of the benchmark, it compares the beginning timestamp to the final (last recorded) timestamp. MobileMark 2012 derives its system battery life rating as the number of minutes between the start and end timestamps.

For more information on this benchmark, see www.bapco.com/products/mobilemark2012/index.php.

APPENDIX B – SYSTEM CONFIGURATION INFORMATION

Figure 9 and 10 provide detailed configuration information for the test systems.

System	HP Compaq 8000 Elite Convertible Minitower	HP EliteDesk 800 G1 DM Business PC
General		
Number of processor packages	1	1
Number of cores per processor	2	4
Number of hardware threads per core	1	2
Total number of processor threads in system	2	8
System power management policy	Balanced	Balanced
Processor power-saving option	EIST	EIST
CPU		
Vendor	Intel	Intel
Name	Core 2 Duo	Core i7
Model number	E8400	4765T
Stepping	E0	C0
Socket type	Socket LGA775	Socket 1150 LGA
Core frequency (GHz)	3.0	2.0 (Turbo Boost 3.0 GHz)
Bus frequency	1,333	DMI 2 (5 GT/s)
L1 cache	2 x 32 KB + 2 x 32 KB	4 x 32 KB + 4 x 32 KB
L2 cache	6 MB	4 x 256 MB
L3 cache	N/A	8 MB
Platform		
Vendor	Hewlett-Packard	Hewlett-Packard
Motherboard model number	3647h	1825
Motherboard chipset	Intel Q45/Q43	Intel Q87
BIOS name and version	Hewlett-Packard 786G7 v01.13 (07/20/2011)	Hewlett-Packard L04 v02.02 (03/18/2014)
Memory module(s)		
Vendor and model number	Samsung M378B5673EH1-CH9	Samsung M471B5173QH0-YK0
Type	PC3-10600	PC3-12800
Speed (MHz)	667	1,600
Speed running in the system (MHz)	533	1,600
Timing/Latency (tCL-tRCD-tRP-tRASmin)	7-7-7-20	11-11-11-28
Size (MB)	2,048	4,096
Number of memory module(s)	2	1
Total amount of system RAM (GB)	4	4
Chip organization (single-sided/double-sided)	Double-sided	Double-sided
Channel (single/dual)	Dual	Single

System	HP Compaq 8000 Elite Convertible Minitower	HP EliteDesk 800 G1 DM Business PC
Hard disk		
Vendor and model number	Seagate® ST3320418AS	HGST HTS725050A7E6300
Number of disks in system	1	1
Size (GB)	320	500
Buffer size (MB)	16	8
RPM	7,200	5,400
Type	SATA 3.0 Gb/s	SATA 3.0 Gb/s
Controller	Intel Express Chipset SATA RAID Controller	Intel 8 Series/C220 Chipset Family SATA AHCI Controller
Driver	Intel 10.1.0.1008 (11/06/2010)	Intel 12.9.0.1001 (10/28/2013)
Operating system		
Name	Windows 7 Professional x64	Windows 7 Professional x64
Build number	7600	7600
Service Pack	1	1
File system	NTFS	NTFS
Kernel	ACPI x64-based PC	ACPI x64-based PC
Language	English	English
Microsoft DirectX version	DirectX 11	DirectX 11
Graphics		
Vendor and model number	Intel GMA 4500	Intel HD Graphics 4600
Type	Integrated	Integrated
Chipset	Intel 4 Series Express Chipset Family	Intel HD Graphics Family
BIOS version	2066.0	2177.0
Total available graphics memory (MB)	1,695	1,696
Dedicated video memory (MB)	64	64
System video memory (MB)	0	0
Shared system memory (MB)	1,631	1,632
Resolution	1,280 x 1,024	1,280 x 1,024
Driver	Intel 8.15.10.2413 (06/03/2011)	Intel 10.18.10.3621 (05/16/2014)
Sound card/subsystem		
Vendor and model number	Realtek® High Definition	Realtek High Definition
Driver	Realtek 6.0.1.6383 (05/31/2011)	Realtek 6.0.1.7224 (04/15/2014)
Ethernet		
Vendor and model number	Intel 82567LM-3 Gigabit Controller	Intel I217-LM
Driver	Intel 12.10.13.0 (12/16/2013)	Intel 12.10.30.5890 (09/22/2013)
Wireless		
Vendor and model number	N/A	Intel Dual band Wireless-N 7260
Driver	N/A	Intel 16.10.0.5 (01/28/2014)
Optical drive(s)		
Vendor and model number	HP CDDVDW TS-H653R	N/A
Type	DVD-RW	N/A

System	HP Compaq 8000 Elite Convertible Minitower	HP EliteDesk 800 G1 DM Business PC
USB ports		
Number	10	6
Type	2.0	3.0
Other	N/A	2 Display Ports
Monitor		
Type	ViewSonic® VG730m	ViewSonic VG730m
Screen size	17"	17"
Refresh rate (Hz)	60	60

Figure 9: Detailed information for the tested desktop systems.

System	HP EliteBook 8460p	HP EliteBook 9470m
General		
Number of processor packages	1	1
Number of cores per processor	2	2
Number of hardware threads per core	2	2
Total number of processor threads in system	4	4
System power management policy	Balanced	HP Optimized
Processor power-saving option	EIST	EIST
System dimensions (length x width x height)	13-3/4" × 9-3/8" × 1-3/8"	13-1/4" × 9-1/8" × 3/4"
System weight	5 lbs. 7 oz.	3 lbs. 10 oz.
CPU		
Vendor	Intel	Intel
Name	Core i5	Core i7
Model number	2520M	3687U
Stepping	D2	E1
Socket type and number of pins	Socket 988B rPGA	Socket 1023 FCBGA
Core frequency (GHz)	2.50 (Max Turbo 3.20)	2.10 (Max Turbo 3.30)
L1 cache	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)
L2 cache	512 KB (256 KB per core)	512 KB (256 KB per core)
L3 cache	3 MB	4 MB
Platform		
Vendor	HP	HP
Motherboard model number	161C	18DF
Motherboard chipset	Intel QM67	Intel QM77
BIOS name and version	HP 68SCF Ver. F.42 (07/15/2013)	HP 68IBD Ver. F.48 (01/13/2014)
Memory module(s)		
Vendor and model number	Hynix HMT351S6BFR8C-H9	Samsung M471B1G73DB0-YK0
Type	PC3-10600	PC3-12800

System	HP EliteBook 8460p	HP EliteBook 9470m
Speed (MHz)	1,333	1,600
Speed running in the system (MHz)	1,333	1,600
Timing/Latency (tCL-tRCD-tRP-tRASmin)	9-9-9-24	11-11-11-28
Size (MB)	4,096	8,192
Number of memory module(s)	1	1
Total amount of system RAM (GB)	4	8
Chip organization (single-sided/double-sided)	Double-sided	Double-sided
Channel (single/dual)	Single	Single
Hard disk		
Vendor and model number	Hitachi HTS725032A9A364	Intel SSDSC2BF240A4H
Number of disks in system	1	1
Size (GB)	320	240
Buffer size (MB)	16	N/A
RPM	7,200	N/A
Type	SATA 3.0 Gb/s	SATA 6.0 Gb/s
Controller	Intel Mobile Express Chipset SATA AHCI Controller	Intel 7 Series Chipset Family SATA AHCI Controller
Driver	Intel 10.1.2.1004 (01/12/2011)	Intel 11.2.0.1006 (05/30/2012)
Operating system		
Name	Windows 7 Professional x64	Windows 7 Professional x64
Build number	7600	7600
Service Pack	1	1
File system	NTFS	NTFS
Kernel	ACPI x64-based PC	ACPI x64-based PC
Language	English	English
Microsoft DirectX version	DirectX 11	DirectX 11
Graphics		
Vendor and model number	AMD Radeon™ HD 6470M	Intel HD Graphics 4000
Type	Discrete	Integrated
Chipset	ATI™ Radeon HD 6470M	Intel HD Graphics Family
BIOS version	BR39846.001	2130.0
Total available graphics memory (MB)	2,791	1,696
Dedicated video memory (MB)	1,024	64
System video memory (MB)	0	0
Shared system memory (MB)	1,767	1,632
Resolution	1,366 × 768 × 32-bit	1,600 × 900 × 32-bit
Driver	ATI Technologies Inc. 13.200.0.0 (09/11/2013)	Intel 8.15.10.2778 (06/06/2012)
Sound card/subsystem		
Vendor and model number	IDT High Definition Audio CODEC	IDT High Definition Audio CODEC

System	HP EliteBook 8460p	HP EliteBook 9470m
Driver	IDT 6.10.6433.0 (10/24/2012)	IDT 6.10.6425.0 (08/19/2012)
Ethernet		
Vendor and model number	Intel 82579LM Gigabit	Intel 82579LM Gigabit
Driver	Intel 12.6.45.0 (05/15/2013)	Intel 11.16.96.0 (03/15/2012)
Wireless		
Vendor and model number	Intel Centrino Advanced-N 6205	Intel Centrino Advanced-N 6235
Driver	Intel 15.2.0.19 (06/03/2012)	Intel 15.9.0.5 (06/16/2013)
Modem		
Vendor and model number	LSI HDA Modem	N/A
Driver	LSI 2.2.100.0 (01/26/2010)	N/A
Optical drive(s)		
Vendor and model number	HP GT31L	N/A
Type	DVD-RW	N/A
USB ports		
Number	4	3
Type	2 × USB 3.0, 1 × USB 2.0, 1 × USB 2.0/eSATA	3 × USB 3.0
Other	Media card reader	Display Port
IEEE 1394 ports		
Number	1	0
Monitor		
LCD type	HD LED WXGA	SVA HD+
Screen size	14"	14"
Refresh rate (Hz)	60	60
Battery		
Type	HP HSTNN-DB2G	HP BT04XL
Size (length × width × height)	8" × 1-7/8" × 3/4"	8-1/8" × 5-7/8" × 1/4"
Rated capacity	5600mAh / 11.1V (62Wh)	3400mAh / 14.8V (52Wh)
Weight (oz.)	11	12

Figure 10: Detailed information for the tested notebook systems.

APPENDIX C – HOW WE TESTED

MEASURING TIME TO BOOT

Time to boot
1. Simultaneously start the timer and boot the system.
2. Stop the timer when the word Start appears.
3. Record the result as the Boot time.
4. Repeat steps 1 through 3 two more times, and report the median of the three runs.

MEASURING TIME TO OPEN APPLICATIONS

Time to open Adobe Photoshop Elements 12 and convert a project to JPEG

Setting up the test
1. Download and install Photoshop Elements with default options from
   www.adobe.com/cfusion/tdrc/index.cfm?product=photoshop_elements&loc=en.
2. Copy the test Photoshop Elements test file to the desktop.

Running the test
1. Boot the system and bring up an administrative command prompt:
   a. Type CMD
   b. Right-click the Command Prompt app to open App options.
   c. Click the Run as administrator button.
2. Type Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks
   Do not interact with the system until the command completes.
3. After the command completes, wait 5 minutes before running the test.
4. Simultaneously double-click the Adobe Photoshop Elements test file, and start the stopwatch.
5. Stop the stopwatch when the file is loaded into Photoshop Elements.
6. Click File→Save As.
7. Select JPEG from the drop down format menu and enter a file name.
8. Click Save.
9. In JPEG Options, slide the file size bar all the way to the right for the largest file (12).
10. Simultaneously click OK, and start the stopwatch.
11. Stop the stopwatch when the progress bar disappears and the curser stops spinning.
12. Shut down the system.
13. Repeat steps 1 through 12 two more times, and report the median of three runs.

Time to open Adobe Premiere Elements 12 and encode a file to MPEG

Setting up the test
1. Download and install Premiere Elements with default options from
   www.adobe.com/cfusion/tdrc/index.cfm?product=premiere_elements&loc=us.
2. Copy the Adobe Premiere Elements test file to the desktop.

Running the test
1. Boot the system and bring up an administrative command prompt:
   a. Type CMD
   b. Right-click the Command Prompt app to open App options.

c. Click the Run as administrator button.
2. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
   Do not interact with the system until the command completes.

3. After the command completes, wait 5 minutes before running the test.
4. Simultaneously double-click the Adobe Premiere Elements test file, and start the stopwatch.
5. Stop the stopwatch when the project is loaded into Adobe Premiere Elements.
6. Click the Share tab and select Computer.
7. Select MPEG, enter a file name, and simultaneously click Save, and start the stopwatch.
8. Stop the stopwatch when the progress bar disappears and the Done button appears.
9. Shut down the system.
10. Repeat steps 1 through 9 two more times, and report the median of three runs.

MEASURING GRAPHICS PERFORMANCE
3DMark
Installing 3DMark Vantage v1.1.2
1. Download the 3DMark Vantage Windows package from www.futuremark.com/benchmarks/3dmark/all.
2. Install 3DMark Vantage with the default options by double-clicking the 3DMark installer.exe file.
   a. At the Welcome screen, click Next.
   b. At the License Agreement screen, click I accept the terms of the license agreement, and click Next.
   c. At the Setup Type screen, click Express, and click Next.
   d. At the Ready to Install the Program screen, click Install.
3. When the 3DMark Read Me page appears in your Web browser, review the document, and click Close when you are finished.
4. At the Setup Complete screen, click Finish.
5. Launch 3DMark Vantage by double-clicking on the 3DMark Vantage desktop icon. Enter the registration code, and click Register.
6. Exit 3DMark Vantage.

Running 3DMark Vantage v1.1.2
1. Boot the system and bring up a command prompt:
   a. Type `CMD`
   b. Right-click the Command Prompt app to open App options.
   c. Click Run as administrator button.
2. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
3. Do not interact with the system until the command completes.
4. After the command completes, wait 5 minutes before running the test.
5. Double-click the 3DMark Vantage desktop icon to launch the benchmark.
6. In the 3DMark Main section, click the Preset pull-down menu arrow, and select Performance.
7. Click the Options tab, then click the Graphic Tests tab, and ensure that both tests are selected.
8. Click the CPU Tests tab, and ensure that both tests are selected.
9. Click the Graphic Tests tab, and ensure that both tests are selected.
10. Click the Feature Tests tab, and deselect all six tests by clicking the check mark by each title.
11. Click Run Benchmark.
12. When the benchmark run completes, record the results.
13. Perform steps 1 through 12 two more times, and report the median of the three runs.

MEASURING SYSTEM PERFORMANCE

HDXPRT 2012

Setting up the test

1. Insert the HDXPRT DVD-ROM into your DVD drive.
2. At the HDXPRT Install screen, tlick Install HDXPRT.
3. Accept the HDXPRT end user license agreement.
4. After the setup is complete, select Yes, I want to restart my computer now, and click Finish.

Running the test

1. Click the HDXPRT 2012 shortcut on the desktop.
2. Click Run HDXPRT.
3. Enter a test name, choose 3 iterations, and click Run.
4. The Results Screen automatically appears at the end of a successful run. The test results files are found in the C:\ProgramFiles\HDXPRT\Reports\<TestName> directory.

BAPCo SYSmark 2012 v1.5.4.317

Antivirus software conflicts

SYSmark 2012 is not compatible with any virus-scanning software, so we uninstalled any such software that was present on the notebook PCs before we installed the benchmark.

Pre-installed software conflicts

SYSmark 2012 installs the following applications, which its test scripts employ:

- ABBYY FineReader Pro 10.0
- Adobe Acrobat Pro 9
- Adobe Dreamweaver® CS5
- Adobe Flash Player 10.1
- Adobe Photoshop CS5 Extended
- Adobe Premiere Pro CS5
- Adobe After Effects® CS5
- Autodesk® 3ds Max® 2011
- Autodesk AutoCAD® 2011
- Google SketchUp® Pro 8
- Microsoft Excel 2010
- Microsoft Internet Explorer 8 (or newer version, if already installed)
- Microsoft Outlook 2010
- Microsoft PowerPoint 2010
- Microsoft Word 2010
- Mozilla Firefox 3.6.8
- WinZip Command Line 3.2

If any of these applications are already on the system under test, they will cause problems with the benchmark due to software conflicts. To avoid any such issues, before we installed the benchmark, we uninstalled all conflicting pre-installed software applications, including different versions of any of the programs SYSmark 2012 uses.

Setting up the test

1. Disable the User Account Control.

Upgrading laptops and desktops to the new HP EliteBook Folio 9470m and HP EliteDesk 800 G1 Desktop Mini Business PC

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a. Click Start➔Control Panel.
b. At the User Accounts and Family Safety settings screen, click Add or remove user account.
c. At the User Account Control screen, click Continue.
d. Click Go to the main User Accounts page.
e. At the Make changes to your user account screen, click Turn User Account Control on or off.
f. At the User Account Control screen, click Continue.
g. Uncheck Use User Account Control to help protect your computer, and click OK.
h. At the You must restart your computer to apply these changes screen, click Restart Now.
2. Purchase and install SYSmark 2012 v1.5.4.317 with default settings from https://www.bapcostore.com/store/product.php?productid=16185&cat=251&page=1.
3. Launch SYSmark 2012 by double-clicking the desktop icon and select Configuration.
4. Select all options and click Apply.
5. Reboot the system.

Running the test
1. Launch SYSmark 2012 by double-clicking the desktop icon.
2. Enter a Project name.
3. Select 3 Iterations, check the box beside Conditioning Run, and click Run Benchmark.
4. When the benchmark completes and the main SYSmark 2012 menu appears, click Save FDR to create a report.

Futuremark PCMark 7 Advanced v1.4.0

Setting up the test
1. Download the PCMark 7 installer exe Windows package from www.futuremark.com/benchmarks/pcmark7.
2. Install PCMark 7 with the default options by double-clicking the PCMark installer exe file.
3. Launch PCMark 7 by clicking on the PCMark 7 desktop icon. Enter the registration code, click Register, and click OK.
4. Exit PCMark 7.

Running the test
1. Reboot the system.
2. Double-click the PCMark 7 desktop icon to launch the benchmark.
3. Select all test suites.
4. Click Run Benchmark.
5. When the benchmark run completes record the results.
6. Repeat steps 1 through 5 two more times, and report the median of the three runs.

MEASURING BATTERY LIFE (NOTEBOOKS ONLY)

Measuring battery life with MobileMark 2012

Avoiding antivirus software conflicts
MobileMark 2012 is not compatible with any virus-scanning software, so we uninstalled any such software present on the notebook PCs before we installed the benchmark.

Avoiding pre-installed software conflicts
MobileMark 2012 installs the following applications, which its test scripts employ:

- ABBYY FineReader Pro 11
- Adobe Acrobat Pro X
- Adobe Flash Player 11
- Adobe Photoshop CS5 Extended 12.04

- Adobe Photoshop Elements 10
- Adobe Premiere Pro CS 5.5
- CyberLink PowerDVD Ultra 11
- Microsoft Excel 2010 SP1
- Microsoft Internet Explorer
- Microsoft Outlook 2010 SP1
- Microsoft PowerPoint 2010 SP1
- Microsoft Windows Media Player
- Microsoft Word 2010 SP1
- Mozilla Firefox 10.0.2
- WinZip Pro 16

If any of these applications are already on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, before we installed the benchmark, we uninstalled all conflicting pre-installed software applications, including different versions of any of the programs MobileMark 2012 uses.

Adjusting display brightness and power settings

The brightness of a notebook's display affects its battery life. Therefore, BAPCo requires that, before you test with MobileMark 2012, you do the following step: make sure the brightness of the notebook's monitor is greater than or equal to 150 nits on a completely white screen while the notebook is unplugged and running on battery power. The measurement follows the standards from the Video Electronics Standards Association (www.vesa.org).

We complied with this standard for all the tests we ran by setting the notebook PC's brightness as close to 150 nits as we could without going below that brightness level. We used the following procedure before we started each test. Note: This procedure assumes we began with the notebook plugged into the power supply.

1. To create a completely blank, white screen, open Microsoft Paint by clicking Start→All Programs→ Accessories→Paint.
2. Press Ctrl+W to open the Resize and Skew dialog.
3. Under Horizontal and Vertical enter 200, and click OK.
4. Click the View tab.
5. Click Full screen to view a white screen.
6. Wait 45 minutes to allow the screen to warm.
7. Unplug the notebook from the power supply, and measure the display's brightness using a luminance meter in the center of the screen. (We used the Gossen® Mavolux 5032C.)
8. If the reading is below or significantly greater than 150 nits, adjust the screen brightness to as close to 150 nits, without going under, as possible. Then retest:
   a. Click the Windows start button, and type `power options` in the Windows Start Search box.
   b. Click Change plan settings.
   c. Click Change advanced power settings.
   d. Expand the Display option, and change the Display brightness on battery and plugged in to the correct percentage that produces no less than 150 nits.
9. Allow the notebook to run on battery power for 10 minutes, re-measure the display, and adjust the brightness up or down as necessary.
10. Verify that the notebook saved the brightness setting by plugging in the system, unplugging it, and taking another reading.

Using the MobileMark built-in Configuration Tool

This tool supports three levels of configuration:

1. Only makes changes that are REQUIRED in order for the benchmark to run.
2. Additionally, makes changes that are RECOMMENDED for repeatable results.
3. Additionally, makes OPTIONAL changes that help ensure best results.

The Configuration tool makes the following configuration changes at each of the three levels:

Level 1 - Required
- Disables User Account Control (UAC)
- Disables Windows Update
- Disables System Sleep and Hibernate
- Sets Screen Dimming Timeout (2 minutes)
- Disables Low Battery Actions
- Disables Network Proxies
- Disables Autorun for Optical Drive

Level 2 - Recommended
- Create BAPCo power scheme
- Set Power Plan Type to balanced
- Disables Windows Firewall
- Disables Windows Sidebar/Gadgets
- Disables Windows Pop-ups
- Disables Incoming Remote Desktop Connections
- Disables Windows Error Reporting
- Disables Screen Saver and Monitor Timeout
- Sets CPU Adaptive Mode
- Disables Desktop Slideshow
- Disables Disk Defrag

Level 3 - Optional
- Sets Hard Disk Timeout
- Disables Windows Defender
- Disables System Restore
- Ignores Laptop Lid Close
- Sets Maximum Display Brightness
- Disables Adaptive Brightness

We chose all options listed - Level 3- in the Configuration tool.

Installing MobileMark 2012 and configuring the system for testing

1. Verify that the wireless adapter is enabled and connected to a wireless router that is not connected to the Internet.
2. Insert the MobileMark 2012 Install DVD into the notebook PC's DVD drive.
3. When the Autoplay menu appears, click Run MobileMark2012_Setup.exe.
4. At the Welcome screen, click Next.
5. Enter the serial number, and click Next.
6. Accept the license agreement, and click Next.

7. At the Choose Components screen, select Full, and click Next.
8. At the Choose Install Location screen, accept the default location of C:\Program Files (x86)\BAPCo\MobileMark2012, and click Next.
9. At the Choose Start Menu Folder screen, click Install.
10. Insert Disc 2 when prompted.
11. At the InstallShield Wizard Complete screen, click Finish.
12. Launch MobileMark 2012.
13. Click Configuration and choose only the Required options.
14. Click Apply, and restart the computer when prompted.
15. Adjust the screen brightness to no less than 150 nits:
    a. Click the Windows start button, and type `power options` in the Windows Start Search box.
    b. Click Change plan settings.
    c. Click Change advanced power settings.
    d. Expand the Display option, and change the Display brightness on battery and plugged in to the correct percentage that produces no less than 150 nits.

Conditioning the battery
1. Plug the AC power adapter into the notebook PC, and completely charge the battery.
2. Install MobileMark 2012, following the steps we outlined in the Installing MobileMark 2012 section earlier in this section.
3. Double-click the MobileMark 2012 icon on the desktop.
4. Click the Office Productivity icon.
5. Type `System Conditioning` as the name for this test in the Project Name, check the box next to conditioning, and click Continue.
6. If MobileMark 2012 lists no problems or warnings, click Continue. If it does list any problems or warnings, close MobileMark 2012, and correct the problem(s) before proceeding.
7. When prompted, unplug the AC power adapter. The Office Productivity test begins immediately.
8. The test is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.
9. Plug the AC power adapter into the notebook PC, and completely charge the battery.

Measuring battery life with MobileMark 2012
We performed the following steps to run the MobileMark 2012 Office Productivity benchmark:

1. Double-click the MobileMark 2012 icon on the desktop.
2. Select the Office Productivity test by clicking the Office Productivity icon.
3. Enter a name for this test in the Project Name field, and click Continue.
4. If MobileMark 2012 lists no problems or warnings, click Continue. If it does list any problems or warnings, close MobileMark 2012, and correct the problem(s) before proceeding.
5. When prompted, unplug the AC power adapter. The test begins immediately.
6. The Office Productivity test is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.

We executed the MobileMark 2012 Office Productivity test three times on the system and took the median battery life run as the representative score for that test.

Getting the MobileMark 2012 results

After each MobileMark Productivity 2012 test completed, we plugged the AC power adapter into the notebook PC and turned on the system. MobileMark 2012 started automatically after the system booted, then analyzed the test scores and opened the Test Results Viewer with the results from the last test.

To submit these results to BAPCo, we saved the test results by performing the following steps:

1. Click Save.
2. Enter a name and select FDR to save the results as an FDR file.
3. Click Save again, and select PDF to save the results as a PDF file.
4. Browse to the Documents directory where the result FDR and PDF files were saved.

ABOUT PRINCIPLED TECHNOLOGIES

Principled Technologies®

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We provide industry-leading technology assessment and fact-based marketing services. We bring to every assignment extensive experience with and expertise in all aspects of technology testing and analysis, from researching new technologies, to developing new methodologies, to testing with existing and new tools.

When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, and white papers. Every document reflects the results of our trusted independent analysis.

We provide customized services that focus on our clients' individual requirements. Whether the technology involves hardware, software, Web sites, or services, we offer the experience, expertise, and tools to help our clients assess how it will fare against its competition, its performance, its market readiness, and its quality and reliability.

Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.