

PRESCRIBE MODERN MOBILE PCS FOR MODERN HEALTHCARE

Devices running Windows® 10 and powered by 7th generation Intel® Core™ processors enhance productivity and usability for healthcare workers.

Over the next several years, most healthcare organizations will migrate to the Windows® 10 operating system. Upgrading to a new Windows operating system is a common time for organizations to adopt new device standards and refresh current devices to take advantage of the updated operating system's full capabilities. Organizations evaluating today's device landscape will be pleased to find that there are many suitable new devices across a range of form factors and performance levels. These modern devices—powered by 7th generation Intel® Core™ processors—promise performance gains that can improve productivity for health workers when compared to older devices. This comes at a perfect time for healthcare, because organizations transitioning to electronic medical records (EMRs) and other digital clinical applications are looking for ways to provide anytime, anywhere access to mission-critical applications and data.

At Prowess Consulting, we wanted to determine how much impact modern devices could have in improving productivity for a healthcare organization. To do this, we compared the time to complete several common tasks across four devices: a 2-in-1 and a laptop with 7th generation Intel Core processors, and two 2-in-1 devices with 5th and 4th generation Intel Core processors. We selected these devices because they offer the functionality and portability needed by modern, mobile healthcare workers.

IMPROVING THE USER EXPERIENCE FOR HEALTHCARE WORKERS

Modern, lightweight devices, powered by Windows® 10, are increasingly popular in healthcare because they offer an enhanced touch experience for users, along with a boost in performance. Convertibles and 2-in-1 devices can be used as a laptops or as tablets. And modern features, such as fingerprint readers, strengthen security.



HP® EliteBook® x360 1030 G2 Flip

- 7th gen Intel® Core™ i5-7300U processor
- 2.82 lbs.
- Convertible 2-in-1 (360-degree hinge)



Dell™ XPS™ 13

- 7th gen Intel Core i5-7Y57 processor (ultra-mobile device)
- 2.7 lbs.
- Laptop



HP® EliteBook Revolve® 810 G3

- 5th gen Intel Core i5-5300U processor
- 3.08 lbs.
- Convertible 2-in-1 (360-degree hinge)



Microsoft® Surface® Pro 3

- 4th gen Intel Core i5-4300U processor
- 1.76 lbs.
- 2-in-1 (detachable keyboard)

Our test results showed that the HP® EliteBook® x360, powered by a 7th generation Intel Core processor, performed better than older devices for several critical areas, including:

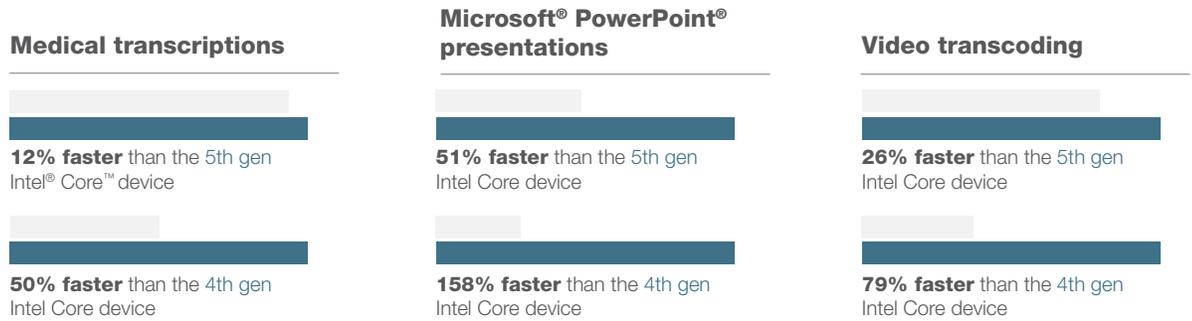


Figure 1. 7th gen Intel® Core™ devices performed faster than previous-generation devices for all tested healthcare scenarios.

Our testing also showed that the super-light, power-efficient Dell™ XPS™ 13, powered by the 7th gen Intel Core processor–based ultra-mobile platform, performed better than the older devices for several key tasks, including video conferencing and creating Microsoft® PowerPoint® presentations.

Putting Mobile PCs to the Test

Older mobile PCs struggle to keep up with the needs of today's healthcare workers. Increasingly, common tasks like transcription and video conferencing, along with everyday tasks like data entry, press the limits of older devices. This can negatively impact productivity and user satisfaction.

Comparatively, modern PCs, with newer 7th gen Intel Core processors, are built to handle demanding needs today and into the future. To verify this, we put the following devices to the test:

- HP EliteBook x360 1030 G2 Flip, powered by a 7th gen Intel Core i5-7300U processor (2.5 GHz)
- Dell XPS 13, powered by a 7th gen Intel Core i5-7Y57 processor (1.20 GHz)
- HP® EliteBook Revolve® 810 G3, powered by a 5th gen Intel Core i5-5300U processor (2.2 GHz)
- Microsoft® Surface® Pro 3, powered by a 4th gen Intel Core i5-4300U processor (1.90 GHz)

We simulated tasks using applications that are important to the workday of healthcare workers and healthcare office staff. In almost every scenario we tested, the HP EliteBook x360, powered by a 7th gen Intel Core processor, performed better than the older devices. And, in several scenarios, the Dell XPS 13, powered by a 7th gen Intel Core processor, also performed better than the older devices.

Healthcare Workers Spend Less Time on Tasks and More Time on Patient Care with Newer Mobile PCs

On any given day, an aid, nurse, technician, or doctor is likely to transcribe recorded notes into the facility's EMR solution. Medical professionals often communicate and collaborate with other providers using Skype® for Business or a similar tool. They also research drug interactions using applications like Epocrates® by athenahealth, and they regularly access picture archiving and communication systems (PACS) to review and even make comments or notes on diagnostic images, such as X-rays.

Our testing found that the 7th gen devices performed better than the 4th and 5th gen devices.



50% faster

to transcribe recorded patient notes using Dragon® Medical on the 7th gen Intel® Core™ device compared to the 4th gen Intel Core device



19% faster

to do a video conference and send an image file using Skype® for Business across the hospital's virtual desktop infrastructure (VDI) using the 7th gen Intel Core ultra-mobile device compared to the 4th gen Intel Core device



15% faster

to use Epocrates® to look up drug interactions over the VDI using the 7th gen Intel Core device compared to the 5th gen Intel Core device



16% faster

to comment on an X-ray using ObjectiveView® on the 7th gen Intel Core device compared to the 5th gen Intel Core device

Even small-percentage increases in performance can have a significant impact on overall productivity. For example, the time to look up a drug interaction on the HP EliteBook x360, powered by a 7th generation Intel Core processor, was 10 seconds faster than on the 5th gen device. If a team of 50 healthcare workers performs just five lookups per day per person, those 10 seconds saved per lookup add up to more than 181 hours per year. That's more than 22 work days—essentially a full work month—saved by using a device powered by a 7th generation Intel Core processor and running Windows 10.

Healthcare Office Staff Can Be More Productive with Mobile PCs Powered by Newer Processors

Our tests show that healthcare office workers also benefit from increased productivity using mobile PCs powered by newer, 7th generation processors. Not only do they experience significant performance gains when using Skype for Business to collaborate with colleagues, they can also complete daily tasks faster with Windows 10 operating system–based PCs powered by 7th generation Intel Core processors.



158% faster

to create a presentation in Microsoft® PowerPoint® on the 7th gen Intel® Core™ ultra-mobile device compared to the 4th gen Intel Core device

79% faster

to transcode an employee training video using the 7th gen Intel Core device compared to the 4th gen Intel Core device

Longer Battery Life Simplifies the Work Day

Newer mobile PCs have more efficient, longer-lasting batteries and improved power-management capabilities. That means healthcare workers are more likely to get through a full shift without having to scramble to find and attach a power cord in the middle of a patient exam or while rushing to complete a presentation.



94% longer

battery life with the 7th gen Intel® Core™ device, compared to the 4th gen Intel Core device

8% longer

battery life with the 7th gen Intel Core device, compared to the 5th gen Intel Core device

91% longer

battery life with the 7th gen Intel Core ultra-mobile device, compared to the 4th gen Intel Core device

7% longer

battery life with the 7th gen Intel Core ultra-mobile device, compared to the 5th gen Intel Core device

Our testing revealed significantly longer battery life for both of the newer, 7th gen devices, compared to the 4th gen device.

Newer Processors Offer Enhanced Security, Manageability, and Stability

In addition to performance gains, all users can benefit from support for new authentication methods that are easier to use, enable faster logons, and add deeper levels of security, including:

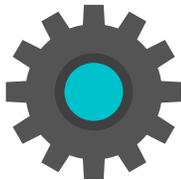


- Windows Hello® technology, which allows users to log on to their devices three times faster than with a password by using facial recognition
- Intel® Authenticate, which allows for hardware-based multi-factor authentication



- Intel® Stable Image Platform Program (Intel® SIPP), which guarantees platform stability, so that operating system images can be installed for a period of 15 months without the need for driver updates

Both of the 7th generation Intel Core processor-based devices we tested also support Intel® Core™ vPro™ technology. Intel Core vPro processors provide additional manageability and stability benefits for healthcare IT managers and staff, including:



- Intel® Active Management Technology (Intel® AMT), which enables IT to remotely update or repair even out-of-band PCs

Improve Productivity and the User Experience with Modern Mobile PCs

As healthcare organizations move to Windows 10, they should consider how new devices can improve worker productivity and user experience. Our research showed that PCs powered by 7th generation Intel Core processors performed significantly better for key healthcare tasks, compared to devices powered by older-generation processors. To keep healthcare medical and office workers productive and focused on care, not computers, we recommend a prescription for newer mobile devices running Windows 10 with 7th generation Intel Core processors.

Appendix A: Hardware and Test Environment

Devices	HP® EliteBook® x360 1030 G2	Dell™ XPS™ 13	HP® EliteBook Revolve® 810 G3	Microsoft® Surface® Pro 3
Processor	Intel® Core™ i5-7300U processor	Intel® Core™ i5-7Y57 processor	Intel® Core™ i5-5300U processor	Intel® Core™ i5-4300U processor
Model	1BS97UT	9365	POC07UT	QG2-00001
Processor Speed	2.5 GHz	1.2 GHz	2.2 GHz	1.9 GHz
Storage	256 GB	256 GB	180 GB	256 GB
Memory	8 GB	8 GB	8 GB	8 GB
Graphics	Intel® HD Graphics 620	Intel HD Graphics 615	Intel HD Graphics 5500	Intel HD Graphics 4400
Ports	1 USB Type-C® with Thunderbolt™, 2 USB® 3.1 (1 charging), 1 HDMI 1.4, 1 external micro SIM, 1 AC power connector, 1 headphone/microphone combo (base)	microSD® card reader, microSDHC reader, microSDXC reader	1 USB 3.0, 1 USB 3.0 charging, 1 DisplayPort™ 1.2, 1 headphone/microphone combo, 1 side docking connector, 1 RJ-45, 1 AC power	USB 3.0, microSD card reader, headphone jack, Mini DisplayPort (mDP)
Audio	Audio by Bang & Olufsen®; integrated dual-microphone array; 4 integrated stereo speakers	MaxxAudio® Pro	Stereo speakers, two microphones	Dolby® audio stereo speakers
Networking	Intel® Dual Band Wireless-AC 8265 802.11 a/b/g/n/ac (2x2) Wi-Fi® and Bluetooth® 4.2 Combo (Intel® vPro™ technology and near-field communication [NFC])	Bluetooth 4.0, IEEE® 802.11ac	Intel® Dual Band Wireless-AC 7265 802.11a/b/g/n/ac WiDi (2x2), Wi-Fi, and Bluetooth 4.0 Combo	Bluetooth 4.0, IEEE 802.11a, IEEE 802.11ac, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n
System Weight	2.82 lbs.	2.7 lbs.	3.08 lbs.	1.76 lbs.
Operating System	Windows® 10 Enterprise	Windows 10 Enterprise	Windows 10 Enterprise	Windows 10 Enterprise
Microsoft® Office Professional Plus 2016	16.0.4266.1001	16.0.4266.1001	16.0.4266.1001	16.0.4266.1001
Skype® for Business 2016	16.0.4266.1001	16.0.4266.1001	16.0.4266.1001	16.0.4266.1001
Dragon® Medical Practice Edition	12.50.350	12.50.350	12.50.350	12.50.350
ObjectiveView™ Digital Pathology Image Viewer	1.46	1.46	1.46	1.46
Cyberlink® MediaEspresso®	7.5.8617	7.5.8617	7.5.8617	7.5.8617
Adobe® Acrobat® Reader®	2017.012.20093	2017.012.20093	2017.012.20093	2017.012.20093
Google™ Chrome™	61.0.3163.100	61.0.3163.100	61.0.3163.100	61.0.3163.100
Microsoft Edge®	40.15063.674.0	40.15063.674.0	40.15063.674.0	40.15063.674.0
Internet Explorer®	11.0.15063.608	11.0.15063.608	11.0.15063.608	11.0.15063.608

File Sizes Used in Prowess Consulting Use Cases	
Image files:	
• cspine40f4.jpg	0.512 MB
• Ankle_Right_x-ray_0002_-no_info.jpg	1.001 MB
• Bound_feet_(X-ray).jpg	4.112 MB
• Lower_Leg_Tib_Fib_Right_x-ray_0000.jpg	1.063 MB
• ankle.tif	12.305 MB
Microsoft® PowerPoint® file (.ppt)	55.5 MB
Audio recording (.mp3)	6.0 MB
Microsoft® Word file (.docx)	12.3 KB
4K video (4K Iceland.mp4)	247.799 MB

For this report, Prowess Consulting tested the performance differences between devices in two different functional tests. We recorded the times for completing each task.

Appendix B: Test Steps

Tests Remotely Accessing Apps via Citrix® XenApp®

Log On to Citrix® StoreFront™

1. Start the timer.
2. From the taskbar, run **mstc**.
3. In the Remote Desktop Computer dialog box, enter server name/IP address.
4. In the Username and Password fields, enter username and password, press Enter, and then wait for the application to fully load.
5. Stop the timer.

Use Skype® for Business through XenApp

1. Start the timer.
2. Double-click a contact's name in Skype for Business.
3. Click the **Video Call** icon.
4. Click **Start My Video**.
5. Click the **Present** icon.
6. Select **Present Desktop**.
7. At the warning message, click **OK**.
8. Click Stop **Presenting**.
9. Click the **chat bubble** icon.
10. Click the **paper clip** icon.
11. Select **Documents**.
12. Select **CSpine4of4.jpg**.
13. Click **Open**, and then wait for the image to share to the recipient device.
14. Stop the timer.

Access athenahealth® Epocrates® through XenApp

1. Start the timer.
2. From the desktop, double-click the **Google Chrome** icon.
3. Stop the timer.
4. Start the timer.
5. Click the **Athenahealth Epocrates Online** bookmark. (Note you will need to have created this bookmark before testing.)
6. Stop the timer.
7. Start the timer.
8. From the top menu, click the **Interaction Check** tab.
9. Click **oxycodone/fentanyl/propofol**, and then wait for the information to load.
10. Stop the timer.

Tests Accessing Applications Locally Installed on the Device

Convert a Video from 4K to 1080p H.264 using CyberLink® MediaEspresso®

1. Start the timer.
2. From the taskbar, open **Media Espresso**.
3. Click **Import Media**.
4. Navigate to the **Videos** folder.
5. Click **Okay**.
6. Wait for the video files in the folder to finish importing.
7. Stop the timer.
8. Start the timer.
9. Select the **Iceland** video.
10. Click **Convert**.
11. Stop the timer.
12. Start the timer.
13. Select all videos in the folder.
14. Click **Convert**.
15. Stop the timer.

Dictate Patient-Examination Notes in Dragon® Medical

Transcribe from a Recording

1. Start the timer.
2. From the desktop, double-click the **Dragon Medical** icon.
3. Stop the timer.
4. Start the timer.
5. Double-click a recorded audio file.
6. Click **Transcribe**, and then wait for the transcription to complete.
7. Stop the timer.
8. Start the timer.
9. Click **Save**, and then wait for the file to finish saving.
10. Stop the timer.

Review and Annotate an X-ray Image in ObjectiveView™ Digital Pathology Viewer

1. Start the timer.
2. From the **Start** menu, double-click the **ObjectiveView** icon.
3. Navigate to folder where X-ray images are located.
4. Hold **Control** and click five X-ray images.
5. Click **Open**.
6. Click **Annotation Tool**.
7. Click the ruler icon.
8. Click and drag from the base of the skull in the image to the top of the fifth vertebra to draw a line.
9. Select the **Circle Tool**.
10. Draw a circle around part of the image.
11. Select the **Rectangle Tool**.
12. Draw a rectangle around part of the image.
13. Select the **Rotate Tool**.
14. Rotate the rectangle 180 degrees.
15. Select the **Arrow Tool**.
16. Draw an arrow pointing to an object on the image.
17. Edit the arrow's notation.
18. Export **Flat TIFF-LZW**.
19. Click **Quit**.
20. Stop the timer.

Edit a Presentation in Microsoft® PowerPoint®

1. Start the timer.
2. From the taskbar, click the **PowerPoint** icon.
3. Stop the timer.
4. Start the timer.
5. From the ribbon, click **Open Other Presentations > Browse > Documents**.
6. Double-click the presentation file to open.
7. In the left-hand pane, click the number of the slide on which to add an image.
8. From the ribbon, click **Insert**.
9. Click **Picture**.
10. Double-click the image to add.
11. From the ribbon, click **File > Save As > Documents**, type a file name, and then press **Enter**.
12. Stop the timer.

Battery Usage

1. Verify the device's battery charge is 100 percent.
2. Start the timer.
3. Disconnect the power.
4. Loop a 4K video repeatedly until the battery is drained.
5. Stop the timer

Appendix C: Test Results

Devices	HP® EliteBook® x360 1030 G2	Dell™ XPS™ 13	HP® EliteBook Revolve® 810 G3	Microsoft® Surface® Pro 3
Converting video	12:48	17:48	16:09	22:52
Dictating audio	31:11	48:25	34:48	46:54
Accessing apps via Citrix® XenApp®	00:22	00:22	00:26	00:26
Using Skype® for Business via XenApp	01:06	01:03	01:16	01:15
Accessing Epocrates® via XenApp	01:02	01:00	01:07	01:06
Reviewing and annotating an X-ray in ObjectiveView™	00:57	01:01	01:06	00:59
Creating a presentation with Microsoft® PowerPoint®	00:22	00:27	00:40	01:09
Opening apps	03:28	05:36	05:14	05:34

Times shown are the mean of three test runs. All times in mm:ss format (smaller is better).

Devices	HP® EliteBook® x360 1030 G2	Dell™ XPS™ 13	HP® EliteBook Revolve® 810 G3	Microsoft® Surface® Pro 3
Battery life	8:34:24	8:28:38	7:57:02	4:25:41

Times shown are the mean of three test runs. All times in h:mm:ss format (larger is better).

¹ Based on the U.S. Office of Personnel Management's work days of 261 in 2017:

www.opm.gov/policy-data-oversight/pay-leave/pay-administration/fact-sheets/computing-hourly-rates-of-pay-using-the-2087-hour-divisor/.

² Microsoft. "Windows Hello: They can guess your password – not your face." www.microsoft.com/en-us/windows/windows-hello.



The analysis in this document was done by Prowess Consulting and commissioned by Intel.

Results have been simulated and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance.

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