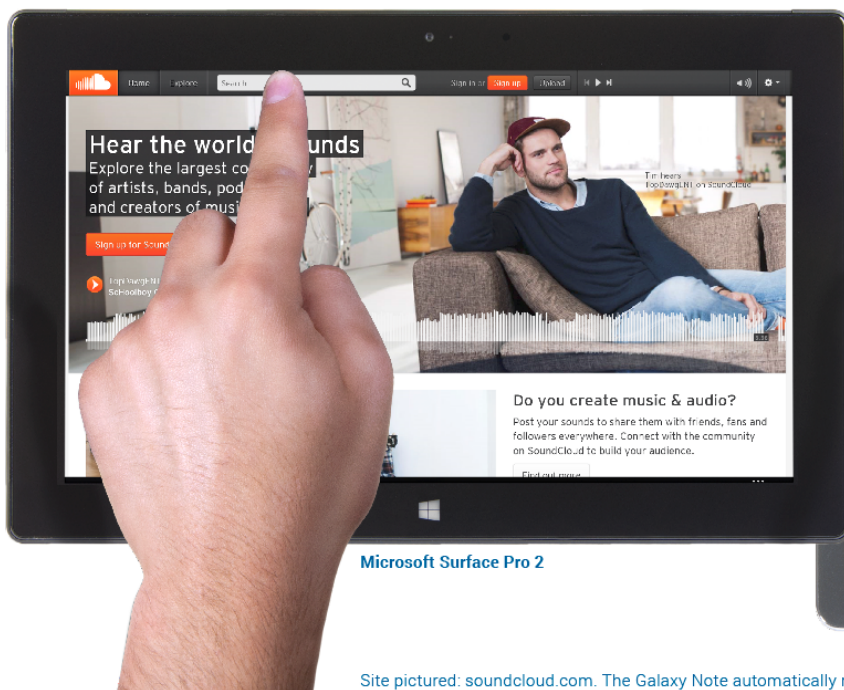
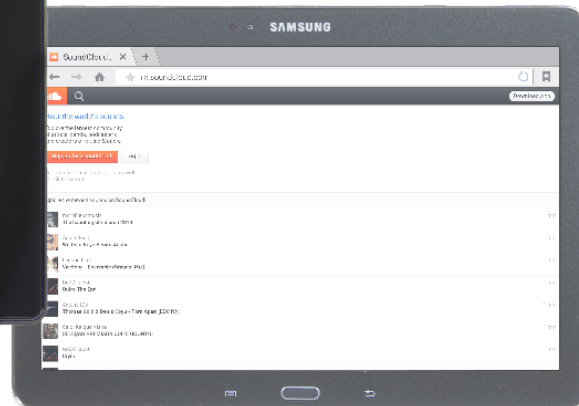


Get a better Web browsing experience with an Intel® processor-powered tablet

From rendering content to touch interactions, the Microsoft® Surface™ Pro 2 had the greatest success displaying Web pages compared to the ARM®-based devices we tested.



Microsoft Surface Pro 2

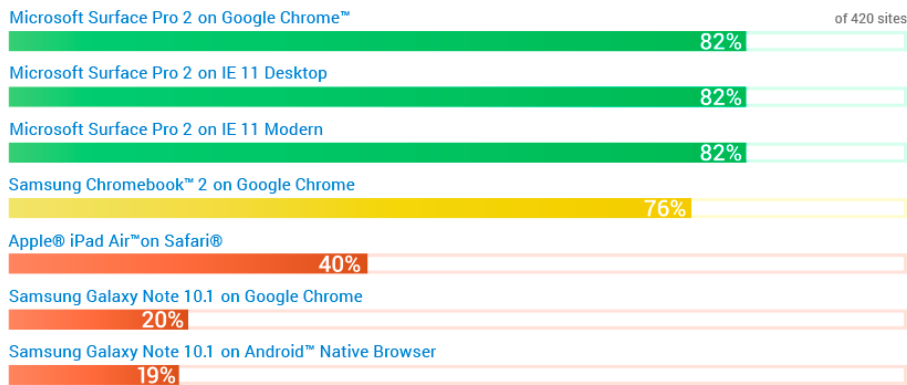


Samsung Galaxy Note® 10.1

Site pictured: soundcloud.com. The Galaxy Note automatically redirected to the mobile version, m.soundcloud.com.

Fewer issues means a better browsing experience. Browsers on the Surface Pro 2 handled **82%** of the sites we visited without issue.

Percent of visited sites with no issues



The Surface Pro 2 handled **95%** of the sites if we switched between browsers when we encountered issues.

Percent of visited sites with no issues when switching between browsers



Many people buying devices, including tablets and Chromebooks, want their tech to be able to handle normal Web browsing without issue. It's a reasonable expectation, but many of these devices have problems viewing and interacting with popular Web sites. If you rely on the Internet every day, why spend your money on a device that limits your experience? The Intel processor-powered Surface Pro 2 tablet can offer the full functionality of the Internet as intended, instead of limited mobile versions of popular Web sites.

In the labs at Principled Technologies, we wanted to see how well tablets and a Chromebook display content online. We evaluated the in-browser appearance, behavior, and usage experience of over 400 Web sites from Alexa’s Top Sites list. Of all the browser/device combinations we tested, we found that browsing on the Intel processor-powered Microsoft Surface Pro 2 offered the best experience with the fewest problems—in either Microsoft Internet Explorer® 11 or Google Chrome™ version 35. With Intel processor-powered tablets, you can get a more complete, feature-rich Internet than with other tablets and Web-dependent devices.

A BETTER VALUE WITH A BETTER INTERNET EXPERIENCE

Your tablet or Chromebook is designed for using the Internet in a small, lightweight, and portable package, and may be a great supplement to your standard notebook at home or work. When you run into a troublesome site, however, you may have to switch to your notebook for a full browsing experience. Intel processor-based tablets offer a way to cut out those nuisances and allow you to enjoy what the Internet has to offer.

Figure 1 shows the combinations of devices and browsers with which we tested 420 popular Web sites.

Device	Operating system	Browser(s)
Microsoft Surface Pro 2	Windows 8.1 Pro 64-bit	Microsoft Internet Explorer 11, Microsoft Internet Explorer 11 Modern UI App, Google Chrome 35
Apple iPad Air	Apple iOS 7.1.1.	Safari 7
Samsung Galaxy Note 10.1 2014 Edition	Android 4.4	Google Chrome 35, native Android browser
Samsung Chromebook 2	Chrome OS 5712.61.0	Google Chrome 35

Figure 1: Tested devices with operating system and browser info.

See [Appendix A](#) for configuration details on each device.

We evaluated the browsing experience on the tablets and the Chromebook by the number of visited sites that displayed problems and the number of problems that each browser displayed, which give a clear representation of user experience. For a complete list of Web sites we visited and problems we encountered, see [Appendix B](#).

- We observed 852 individual problems or issues.
- Of 420 sites, 379 sites had an issue on one or more platforms.

The Internet is constantly changing. To stay current with the demanding user experience required from mobile devices, we created a test methodology that challenges the entire user experience. This methodology is more rigorous than the one we used in a [previous study of the browsing experience on tablets](#).

- We encountered the most issues with the Galaxy Note 10.1 2014 Edition, on the native Android browser (546) and Google Chrome (544), and with the iPad Air (374).
- Google Chrome on the Chromebook 2 had 125 issues.
- The Surface Pro 2 had the fewest issues: 85 with IE 11 Modern App, 84 with IE 11 Desktop, and 90 with Google Chrome.
- Using multiple browsers, the Surface Pro 2 encountered problems on less than 5 percent of the sites.

Figure 2 highlights our findings.



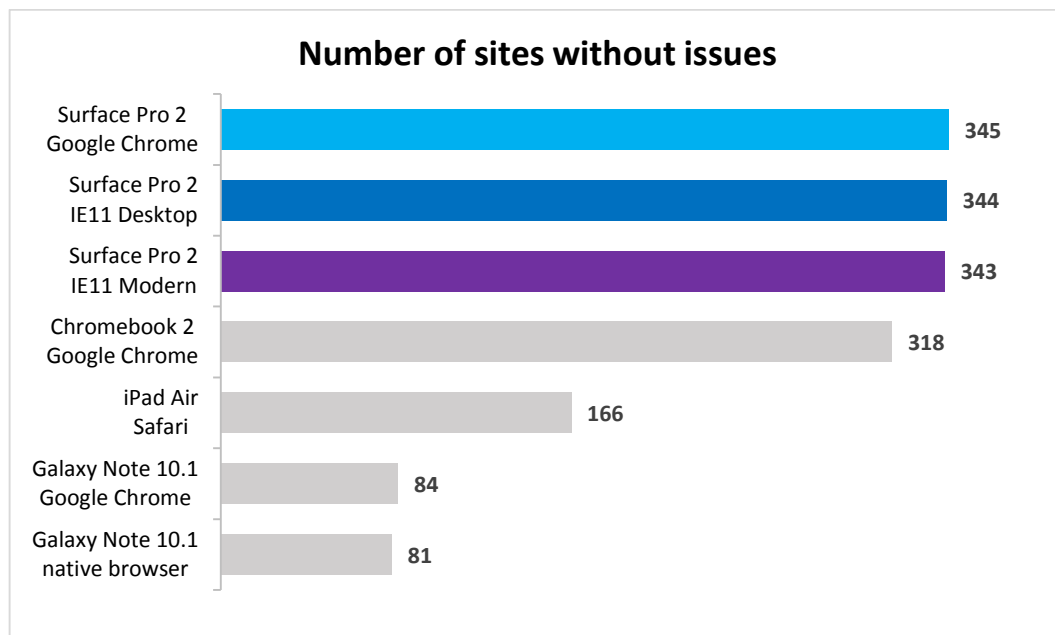
<i>Did the device and browser combination...</i>	 Surface Pro 2 with IE 11	 Surface Pro 2 with IE 11 Modern	 Surface Pro 2 with Chrome	 iPad with Safari	 Galaxy Note 10.1 with Chrome	 Galaxy Note 10.1 with native Android browser	 Chromebook 2 with Chrome
Mouse over menus properly?	✓	✓	✓	✗	✗	✗	✗
Support pinch zooming on every Web site?	✓	✓	✓	✗	✗	✗	✗
Play videos without trouble?	✓	✓	✓	✗	✗	✗	✗

Figure 2: The Intel processor-powered Microsoft Surface Pro 2 experienced the fewest problems and provided the most functionality versus the other devices we tested.

The Microsoft Surface Pro 2 handled 82 percent of the Web sites on our list without experiencing issues. The iPad Air and Galaxy Note 10.1 experienced issues in over half of the sites we tested. Figure 3 shows the number of sites with which each platform displayed the Web site properly.

¹ For the previous version of this report, see www.principledtechnologies.com/Intel/Tablet_browser_experience_0413.pdf.

Figure 3: Using three different browsers, the Intel processor-powered tablet encountered problems with the fewest sites. Higher numbers are better.



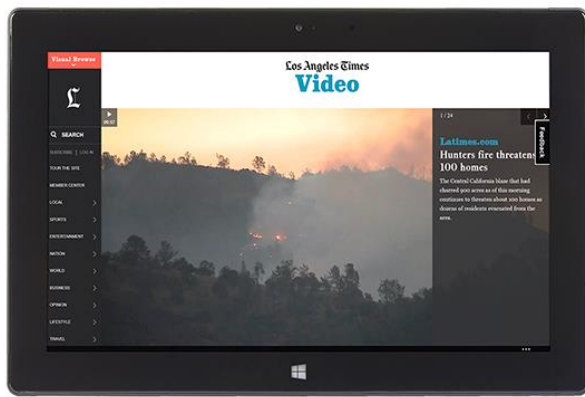
Based on the testing we did on 420 top Web sites (see the full report for a discussion of how we identified them),² an Intel processor-powered Windows 8.1 Pro tablet, such as the Surface Pro 2, can deliver a more stable, predictable Web experience with fewer errors when compared to the other tablets and Chromebook we tested.

LESS HASSLE, MORE INTERNET

It's a hassle when a Web site doesn't display properly—forcing you to pull out a notebook to get the full experience or just accept that you're missing out on something (although you don't know what). We experienced the following kinds of problems in our testing:

- **Audio/video playback issues.** We experienced the fewest issues in this area overall during our testing. Some sites had problems with video or audio not playing when it should have, or had choppy playback. Examples include the Web sites for ESPN, where videos wouldn't play on some devices; Allrecipes, where some devices wouldn't play tutorial videos after the preceding video ad finished; and AT&T, where some browsers displayed a choppy background video. Figure 4 shows how the Surface Pro 2 and the Galaxy Note 10.1 displayed the *Los Angeles Times* Web site.

² www.principledtechnologies.com/Intel/Get_a_better_Web_browsing_experience_0714_unabridged



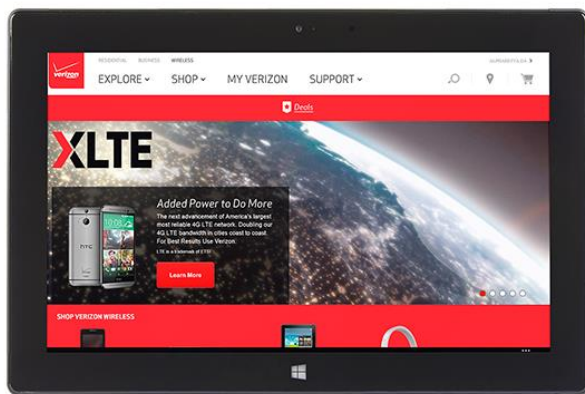
Microsoft Surface Pro 2



Samsung Galaxy Note 10.1

Figure 4: Screenshots comparing latimes.com on the Surface Pro 2 and the Galaxy Note 10.1.

- Layout issues.** Some sites contained bad Web page formatting, unintentionally cut off images or text, extraneous whitespace, or navigation bars not scrolling properly with the rest of the page. Examples include the Web site for Ticketmaster, where text in the main slideshow was cut off in some browsers, and Lifehacker, where the Popular Stories list didn't scroll along with the site for some devices. Figure 5 shows how the Surface Pro 2 and the Samsung Chromebook 2 displayed the Web site for Verizon Wireless.



Microsoft Surface Pro 2



Samsung Chromebook 2

Figure 5: Screenshots comparing verizonwireless.com on the Surface Pro 2 and the Chromebook 2.

- Missing or broken features.** Some sites failed to include intended elements or content, had unresponsive buttons, lacked functionality, or did not load at all. Examples include Myspace, which didn't load additional content when we scrolled to the end of the site in some browsers; the NBA Web site, which didn't load at all on the native Android browser; and Pinterest, whose Tour for new users didn't display. Figure 6 shows how the Surface Pro 2 and the iPad displayed Netflix.



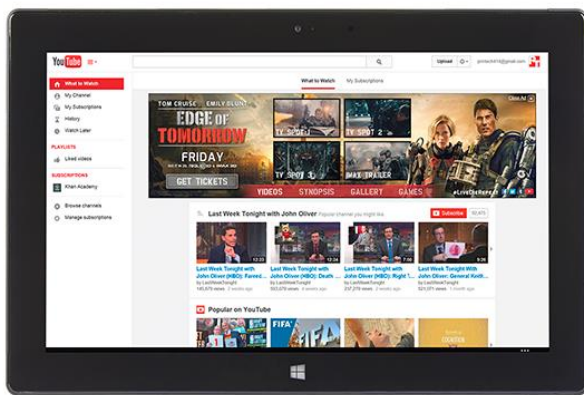
Microsoft Surface Pro 2



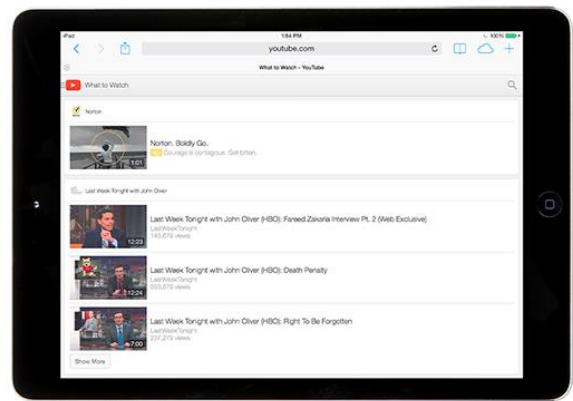
Apple iPad Air

Figure 6: Screenshots comparing netflix.com on the Surface Pro 2 and the iPad Air.

- Device detection issues.** To keep up with a broad range of devices, some Web sites have desktop, mobile, and tablet versions. These sites choose what version to display based on your browser and operating system. In our testing, some sites loaded mobile-optimized versions with layouts designed for phones rather than tablets. Examples include Facebook, BuzzFeed, and Huffington Post. Figure 7 shows how the Surface Pro 2 and the iPad displayed YouTube.



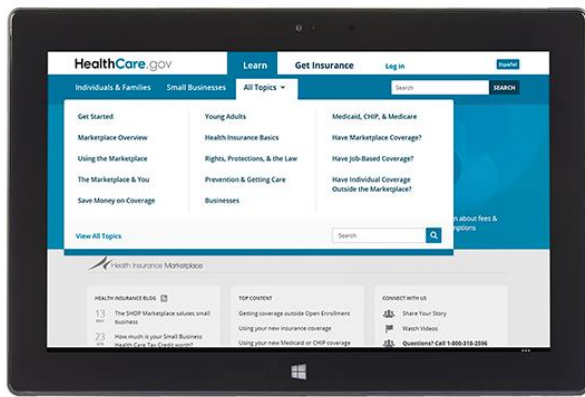
Microsoft Surface Pro 2



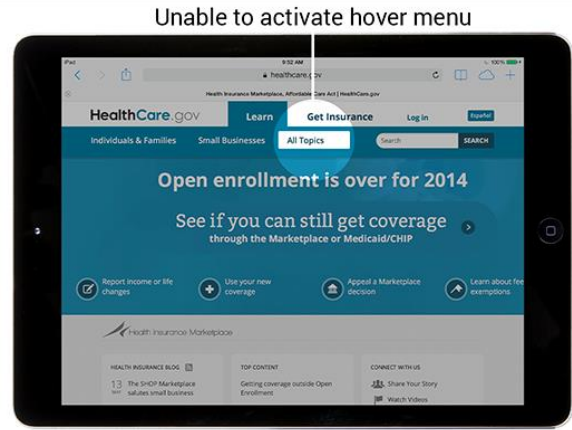
Apple iPad Air

Figure 7: Screenshots comparing youtube.com on the Surface Pro 2 and the iPad Air.

- Touch interaction issues.** Some sites did not allow the tested device to perform touch actions, such as zooming by pinching, mousing over menus, and scrolling by swiping. Examples of sites with touch interaction issues on some browsers include Southwest Airlines, whose menus we couldn't mouse over; Vimeo, which didn't allow some devices to zoom; and Tiger Direct, where scrolling didn't work in dropdown menus. Figure 8 shows how the Surface Pro 2 and the iPad displayed HealthCare.gov.



Microsoft Surface Pro 2



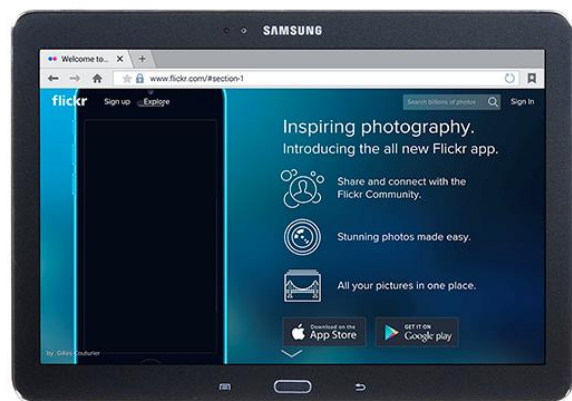
Apple iPad Air

Figure 8: Screenshots comparing healthcare.gov on the Surface Pro 2 and the iPad Air.

- Visual/presentation issues.** We experienced the most issues in this area overall during our testing. Some sites presented issues on devices that didn't necessarily hinder the functionality of the site, but could distract you with jumpy navigation bars, sluggish animations, or re-rendering visual content when the user scrolls. On some browsers, the slideshow on CBS.com had sluggish transition animations; the Web site for Disqus had an applet with bouncing bubbles that suffered from very low frame rates; and scrolling on Tumblr forced re-rendering of content on the page. Figure 9 shows how the Surface Pro 2 and the Galaxy Note 10.1 displayed Flickr, which did not load the images appearing on the iPhone like the Surface Pro 2.



Microsoft Surface Pro 2

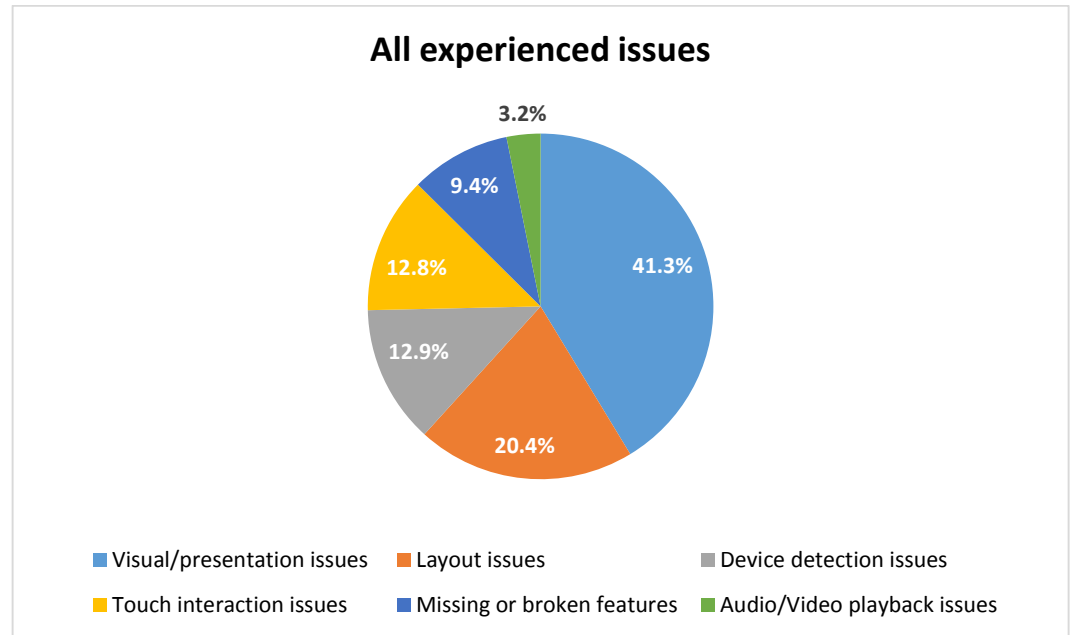


Samsung Galaxy Note 10.1

Figure 9: Screenshots comparing flickr.com on the Surface Pro 2 and the Galaxy Note 10.1.

Figure 10 shows a percentage breakdown of these issues in terms of frequency across all the devices we tested.

Figure 10: A breakdown of the types of issues we observed.



FULL FEATURE WEB SITES WITHOUT APPS

About 53 percent of the Web sites that presented issues offer iOS or Android apps that serve as workarounds (see [Appendix B](#) for these sites and the platforms for which apps are available). While we did not test these apps, we did check the availability of an app for every Web site we tested. Some users might welcome these alternatives, but they are not an ideal solution for everyone. Using a workaround app means having to download and possibly purchase the app—taking up home screen real estate and memory on your device. In addition, the app may lose much of the functionality of the Web site it attempts to work around.

USING MULTIPLE BROWSERS

On some types of devices, users commonly have more than one browser. Many people who use Windows devices, for example, use both Chrome and Internet Explorer. For those users, the first reaction to finding a troublesome site is to open it in another browser on the device rather than downloading and installing an app for every site with a problem. They don't want apps for every Web site they visit or they don't have room to hold them all. By testing popular browsers on the Microsoft Surface Pro 2, we found less than 5 percent of the 420 Web sites we visited had issues in the browsers. In testing popular browsers of the ARM-based Galaxy Note 10.1, we found over half of the Web sites could not display properly in the browser. Most Chromebook users browse the web with just one browser—Google Chrome—and many iPad users browse the web with just one browser—Safari. We experienced problems on 24 percent of the sites on the Samsung Chromebook 2, and 60 percent of the sites on the iPad Air.

CONCLUSION

Though we often use tablets and Chromebooks for Web browsing, they don't always offer enough support for online content and functionality. Both the device and the Web browser can affect Web performance, and to browse the Web easily at home or in the office, you need a configuration that works with most Web sites. In our tests, the Intel processor-powered Microsoft Surface Pro 2 was the clear winner, browsing well with either Microsoft Internet Explorer 11 or Google Chrome 35. The Intel processor-powered device had no trouble mousing over menus, zooming by pinching, or playing videos. In addition, it had the fewest overall problems with the 400-plus Web sites that we tested. Intel processor-based tablets can offer a full experience on the Internet where others cannot.

APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figure 11 provides detailed configuration information for the test systems.

System	Microsoft Surface Pro 2	Samsung Galaxy Note 10.1 2014 Edition	Apple iPad Air	Samsung Chromebook 2
General				
Number of processor packages	1	2	1	2
Number of cores per processor	4	4	2	4
Number of hardware threads per core	2	1	1	1
Total number of threads	4	8	2	8
System dimensions (length x width x height)	10.8" x 6.8" x 0.5"	9.5" x 6.7" x 0.3"	9.4" x 6.6" x 0.3"	11.3" x 8.0" x 0.7"
System weight (pounds)	2.0	1.2	1.0	2.4
CPU				
Vendor	Intel	Samsung	Apple	Samsung
Model number	Core™ i5-4300U	Exynos Octa 5420	A7	Exynos Octa 5420
Core frequency (GHz)	1.9	1.9 / 1.3	1.4	1.9 / 1.3
L1 cache	32KB + 32KB (per core)	32 KB + 32 KB (per core) / 32 + 32 KB (per core)	64 KB + 64 KB (per core)	32 KB + 32 KB (per core) / 32 + 32 KB (per core)
L2 cache	512 KB (256 KB per core)	1 MB (256 KB per core) / 512 KB (128 KB per core)	1 MB	1 MB (256 KB per core) / 512 KB (128 KB per core)
Memory				
Amount of RAM (GB)	4	3	1	4
Type	DDR3	DDR3	DDR3	DDR3
Storage				
Vendor and model number	Integrated flash storage	Integrated flash storage	Integrated flash storage	Integrated flash storage
Size (GB)	64	32	64	16
Operating system				
Name	Windows 8.1 Pro	Android 4.4.2	Apple iOS 7.1.1	Chrome OS 35.0.1916.116
Graphics				
Vendor and model number	Intel HD Graphics 4400	ARM Mali-T628MP6	PowerVR G6430	Integrated
Resolution	1,920 x 1080	2,560 x 1600	2,048 x 1,536	1,366 x 768

System	Microsoft Surface Pro 2	Samsung Galaxy Note 10.1 2014 Edition	Apple iPad Air	Samsung Chromebook 2
Wireless				
Vendor and model number	Marvell® AVASTAR® 350N Wireless Network Controller	802.11 a/b/g/n/ac	802.11a/b/g/n	802.11a/b/g/n/ac
Ports				
USB type	1 x USB 3.0	1 x microUSB	N/A	1 x USB 3.0 + 1 x USB 2.0
Other	Mini DisplayPort 1.2, Micro SDXC, headphone jack	Micro SDXC, headphone jack	Headphone jack	HDMI, Micro SDXC, Headphone jack
Display				
Type	LED-backlit ClearType HD Display	LED-backlit WQXGA TFT Display	LED-backlit Multi-Touch IPS Display	LED-backlit TN Display
Screen size	10.6"	10.1"	9.7"	11.6"
Battery				
Type	Built-in Lithium Ion	Built-in Li-polymer	Built-in Li-polymer	Built-in Li-polymer
Rated capacity	5,400 mAh	8,220 mAh	8,820 mAh	4,080 mAh

Figure 11: Detailed configuration information for the test systems.

APPENDIX B – OUR SITE SELECTION & ISSUE IDENTIFICATION PROCESSES

On May 9, 2014, we took the list of the top 500 viewed Web sites in the United States from Alexa.com (www.alexa.com/topsites/countries/US) and excluded sites with questionable content (adult content, phishing, torrents, etc.), sites without any viewable content (such as googleusercontent.com), and non-English language sites until we ended up with a list of 420 Web sites. We then created six categories of potential issues that could affect user experience.

After these steps, we visited each of the 420 sites on each browser/device combination looking for any elements of the Web site that did not perform correctly or were missing. After each Web site loaded, we performed the following steps for identifying issues:

- **Audio/video playback issues**
 1. Attempt to play any audio or video elements on the page.
 2. Note if playback does not occur or is choppy, resulting in difficulty hearing or viewing the element in its entirety as intended.
- **Layout issues**
 3. Note any irregular formatting, including cutoff images and text, extraneous whitespace, or the page loading wider than the screen size by default.
 4. Scroll the page, and note any elements of the page that malfunction while scrolling, such as navigation bars not moving with the user or not locking in place.
- **Missing or broken features**
 5. Attempt to use all the functional elements of the page, including opening menus, navigating slideshows, and loading additional page content when reaching the bottom of an infinitely scrollable site. Note when the elements do not work as expected or at all.
 6. Note if a functional element is missing on a browser, unless the missing element occurs on a mobile or tablet site where its exclusion could be intentional.
- **Device detection issues**
 7. Note if the Web site delivers a mobile-optimized version to the device rather than a tablet-optimized version or desktop version.
- **Touch interaction issues**
 8. Attempt to perform all of the following touch gestures and actions on the device: pinch zooming, mouseover menus either with touch or stylus (the Samsung Chromebook 2 only has a mouse option), and scrolling in every section of the page.
 9. Note if these gestures or actions do not work.
- **Visual/presentation issues**
 10. Look at the site and note any malfunctioning visual elements.
 11. Perform slideshow transitions and watch any animated elements, noting if the performance is slow. Scroll the page and note if the navigation bar is slow or jumpy.
 12. Scroll the page quickly, and note if the page re-renders its content.

ABOUT PRINCIPLED TECHNOLOGIES



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