

Benchmark**XPRT**

BenchmarkXPRT Development Community

## Exploring MobileXPRT 2015



MobileXPRT 2015 is a tool for evaluating the performance of Android devices.

October 09, 2015



**MobileXPRT**

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## INTRODUCTION

This paper explains the concepts behind MobileXPRT 2015. MobileXPRT 2015 evaluates the performance of Android-based devices. Like the other XPRT family benchmarks, it is easy to use, takes less than 15 minutes to run on most devices, runs relatable workloads, and delivers easy-to-understand results. MobileXPRT 2015 is an update of MobileXPRT 2013 that adds support for 64-bit Android devices.

This paper explains the development process for MobileXPRT 2015 and the other BenchmarkXPRT tools. It explains MobileXPRT 2015, including how it calculates results; points you to where you can download the benchmark; and tells you how to submit results. It also describes the BenchmarkXPRT Development Community and how you can become a member.

## DEVELOPMENT PROCESS

We build the BenchmarkXPRT apps using a unique community-driven model. Instead of the closed, bottom-up approach used by many benchmarking efforts, we use an open, top-down approach that includes the BenchmarkXPRT Development Community (the community) throughout the design, development, and testing process.<sup>1</sup>

Our approach starts by taking input from the community and examining the most common use cases for the platforms we plan to benchmark. We then write a Request for Comment (RFC) proposing use cases to incorporate into the benchmark and publish it to the community. The community's input on the RFC guides the drafting of a design document. The design document drives the implementation of the community preview, which we release to the community for input. We make changes based on that input and finalize the code to create a general release.

We keep results stable between the community preview and the general release so that community members can publish results from the community preview without waiting for the general release.

## MOBILEXPRT 2015: THE DETAILS

MobileXPRT 2015 is the latest version of our tool for evaluating the performance of Android devices. MobileXPRT 2015 updates MobileXPRT 2013 to run on 64-bit platforms. MobileXPRT 2015 supports both 32-bit and 64-bit hardware running Android 4.4 or higher.

The new release includes the same performance workloads as MobileXPRT 2013. However, it omits the UX tests, which were useful on lower-end devices when MobileXPRT 2013 came out but don't distinguish modern devices. If you need the UX tests, MobileXPRT 2013 will continue to be available.<sup>2</sup>

MobileXPRT 2015 automatically selects its 64-bit version if the hardware will support it. To test systems running older versions of Android, or to test 32-bit performance on a 64-bit system, you can use MobileXPRT 2013. The results of the two versions are comparable.

MobileXPRT supports UIs in both Simplified Chinese and English. It enables the Simplified Chinese UI on devices set to display that language. Please consult your device's documentation for the steps to change the display language.

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<sup>1</sup> We discuss the community below in the section What is the BenchmarkXPRT Development Community?

<sup>2</sup> You can find MobileXPRT 2013 at [http://principledtechnologies.com/benchmarkxpert/mobilexpert/2013/](http://principledtechnologies.com/benchmarkxprt/mobilexpert/2013/)



Figure 1: The MobileXPRT 2015 start page in Simplified Chinese.

## About the MobileXPRT 2015 test

The five MobileXPRT 2015 workloads mirror common tasks: Apply Photo Effects, Create Photo Collages, Create Slideshow, Encrypt Personal Content, and Detect Faces to Organize Photos.

By default, the benchmark runs all five tasks and reports individual workload scores and an overall score. Optionally, you can run individual tests or subsets of tests, in which case the benchmark does not produce an overall score. The full test typically takes less than 15 minutes to run, but the runtime varies depending on the system.

## Individual workload results

MobileXPRT reports results for each of its five performance workloads:

- **Apply Photo Effects.** This test measures the time to apply four photo effects (Sepia, Vintage, Vignette, and Grayscale) to five 8-megapixel photos each.
- **Create Photo Collages.** This test measures the time to create five photo collages with four photos in each collage. It applies effects to each photo before including it in the collage. This test uses the same photos as the Apply Photo Effects test.
- **Create Slideshow.** This test measures the time to create a slideshow video (H.264, 720p) from a photo album and an audio file (327 KB MP4). This test uses the same photos as the previous two tests.
- **Encrypt Personal Content.** This test measures the time to encrypt (AES 256-bit) and then decrypt two sets of six files. The first set of files comprises five photos and an MP3 audio file. The second set of files comprises five photos and an MP4 video. The 12 pre-encryption files total 165 MB in size.

- **Detect Faces to Organize Photos.** This test measures time to check a set of seven photos for faces. Photos range in size from .3 megapixels to 2.8 megapixels.

The workload results, shown at the end of the test run, are the total time (in seconds) that it took to run the timed section of the workload. Because those results are times, lower scores indicate faster performance and are better.

During the tests, the Apply Photo Effects and Create Photo collage tests display a rate, showing how many photos per second or collages per second the device is processing. Also during these tests, the bottom of the screen displays a series of colored line segments that also show how quickly the device finished each of the tasks in the test. For example, a segment displays for each photo effect in the Apply Photo Effects test showing the time it took to apply the effect. The colors indicate the following:

- Elapsed time between 0 ms – 150 ms = green
- Elapsed time between 150 ms – 1 s = light green
- Elapsed time between 1 s – 2 s = yellow
- Elapsed time between 2 s – 5 s = orange
- Elapsed time > 5 s = red

## Overall performance score

The primary performance test result is the overall score that the benchmark calculates. Like the other members of the BenchmarkXPRT family, MobileXPRT uses a calibration system and calculates the test device's overall score based on how its results compare to those of the calibration system. The calibration system for MobileXPRT is the Motorola\* DROID RAZR\* M (Qualcomm MSM8960 Snapdragon S4Plus Dual Core at 1.5 GHz) running Android JB 4.1.2.

MobileXPRT calculates the overall score as follows:

- For each workload, it divides the time from the calibration system by the time from the test system. This shows, for each workload, how many times slower the calibration is than the test system on that task.
- It calculates the geometric mean of those five ratios and rounds it to two decimal places.
- It multiplies that result by 100.

The score for the calibration system on repeated runs would be 100 (all of its individual test ratios and their geometric mean would be approximately one, which would then multiply by 100 for the performance score).

Here we show how to calculate the score in detail using results from a Lenovo Yoga Tab 10 HD+.<sup>3</sup>

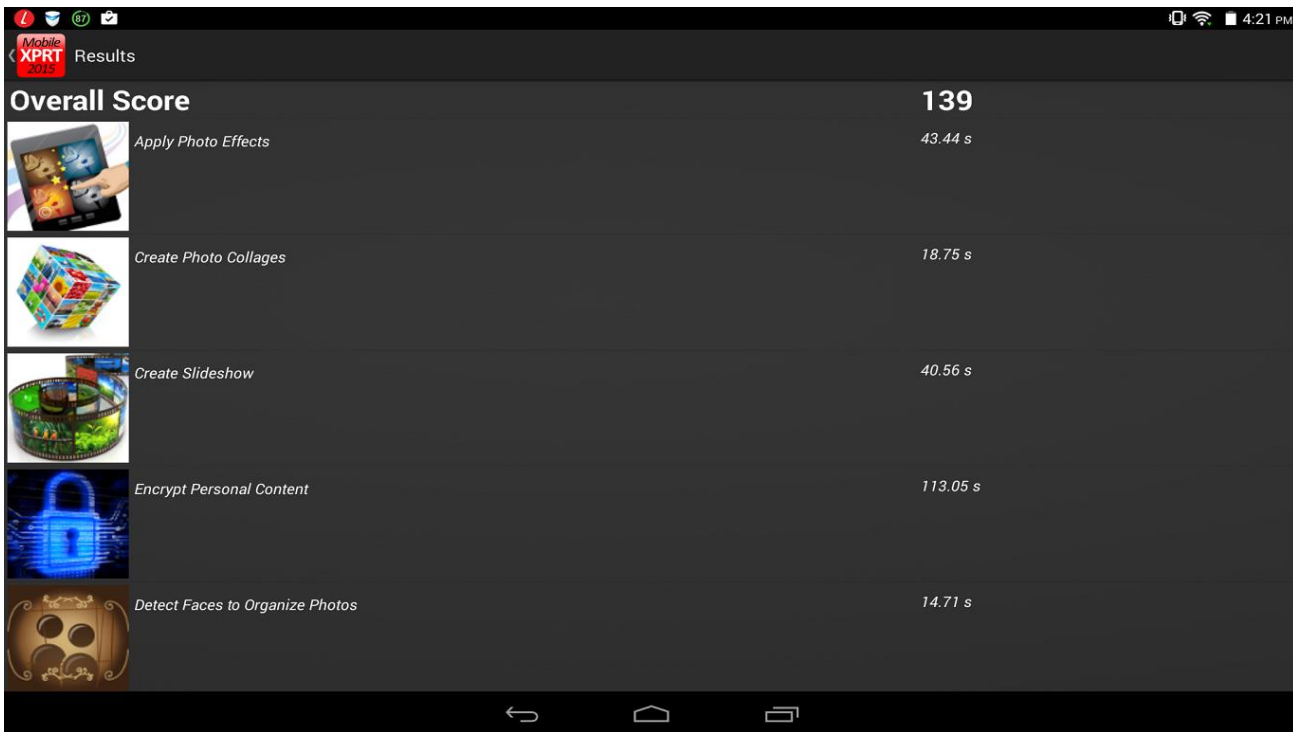


Figure 2: Sample MobileXPRT 2015 results from a Lenovo Yoga Tab 10 HD+.

The table below gives the workload timings and their ratios to the calibration system scores. Community members who download the MobileXPRT 2015 source will find timings for the calibration system in the calibration.xml file.

Workload	Test system time (seconds)	Calibration system time (seconds)	Ratio
Apply Photo Effects	43.44	66.00	1.52
Create Photo Collages	18.75	36.64	1.95
Create Slideshow	40.56	50.00	1.23
Encrypt Personal Content	113.05	168.00	1.49
Detect Faces to Organize Photos	14.71	14.22	0.97

The geometric mean of the five ratios—1.52, 1.95, 1.23, 1.49, and 0.97—rounded to two decimal places is 1.39, which multiplied by 100 matches the overall score of 139, as shown in the results screen above.

The overall score does not express a time, but is instead the result of a calculation based on the ratio of the individual workload scores of the system under test to those of the calibration system. Through this comparison, it

<sup>3</sup> The results and disclosure information are available at [www.pricedtechnologies.com/benchmarkxprt/mobilexprt/2015/details.php?resultid=5](http://www.pricedtechnologies.com/benchmarkxprt/mobilexprt/2015/details.php?resultid=5)

converts the result to a relative measure of performance so that, like the other XPRT benchmarks, higher results are better.

## MOBILEXPRT INSTRUCTIONS

### Where to get it

MobileXPRT 2015 is available at MobileXPRT.com and in the Google Play store. Alternatively, you can download the app using either of the options below:

- MobileXPRT 2015 application and test data, 243 MB (includes test data with the app)<sup>4</sup>
- MobileXPRT 2015 application only, 18 MB (downloads test data during installation)<sup>5</sup>

After trying out MobileXPRT 2015, please submit your scores and send any comments to [BenchmarkXPRTsupport@principledtechnologies.com](mailto:BenchmarkXPRTsupport@principledtechnologies.com).

### How to run it

Consult the User Manual in the MobileXPRT2015.apk file for instructions on how to run the benchmark. The User Manual shows how to configure the test device, how to set up and run the benchmark, and how to uninstall MobileXPRT 2015.

### Comparing results to those in the MobileXPRT database

You can view MobileXPRT 2015 results at the MobileXPRT.com results page.<sup>6</sup>

### Submitting results

To submit MobileXPRT results to Principled Technologies, email the `mobilexpert_results.xml` for a test run to [benchmarkxpertsupport@principledtechnologies.com](mailto:benchmarkxpertsupport@principledtechnologies.com). You will find this file in a date and time stamped directory in the `MobileXPRT/results` directory.

Along with the result file, please give the name we should use as the source of the results. If we have any questions about your submission, we will contact you. However, we will keep your email confidential and will not use your e-mail address for any purpose unrelated to your submission.

## ABOUT THE BENCHMARKXPRT FAMILY

The BenchmarkXPRT tools are a set of apps that help you test how well devices do the kinds of things you do every day. In addition to MobileXPRT 2015 and 2013, the BenchmarkXPRT suite currently includes the following tools:

- BatteryXPRT 2014 for Android measures the battery life of Android-based phones and tablets
- CrXPRT 2015 tests the responsiveness and battery life of Chromebooks

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<sup>4</sup> [www.principledtechnologies.com/benchmarkxpert/mobilexpert/2015/MobileXPRT2015\\_WebInstaller\\_v109.apk](http://www.principledtechnologies.com/benchmarkxpert/mobilexpert/2015/MobileXPRT2015_WebInstaller_v109.apk)

<sup>5</sup> [www.principledtechnologies.com/benchmarkxpert/mobilexpert/2015/MobileXPRT2015\\_v109.apk](http://www.principledtechnologies.com/benchmarkxpert/mobilexpert/2015/MobileXPRT2015_v109.apk)

<sup>6</sup> [www.principledtechnologies.com/benchmarkxpert/mobilexpert/2015/results](http://www.principledtechnologies.com/benchmarkxpert/mobilexpert/2015/results)

- TouchXPRT 2014 tests the responsiveness of Windows 8/8.1 and Windows 10 devices
- WebXPRT 2015 tests the performance and Web browsing capabilities of any device with Internet access
- HDXPRT 2014 uses commercial applications to test the capabilities and responsiveness of PCs

We designed the apps to test a wide range of devices on a level playing field. When you look at results from XPRTs, you get unbiased, fair product comparison information.

## WHAT IS THE BENCHMARKXPRT DEVELOPMENT COMMUNITY?

Community membership is open to anyone, and there are many different ways to participate. Members of the BenchmarkXPRT Development Community can be involved in every step of the process for MobileXPRT and the other XPRT benchmarks that are of interest to them. They can give input on the design of upcoming versions, contribute source code, and help test the benchmarks. Community members have access to previews of upcoming benchmarks and to the source code of released benchmarks.

The community helps us avoid the ivory tower syndrome. Diversity of input during the design process makes the tests more representative of real world activity. Giving community members access to the source code serves to increase confidence in the code and improves future versions of the benchmarks.

The community model differs from the open source model primarily by controlling derivative works. It is important that the BenchmarkXPRT benchmarks return consistent results. If the testing community calls different derivative works by the same name, the result would be that the test results would not be comparable. That would limit, if not destroy, the tools' effectiveness.

For more information, please watch the video introduction to the community <sup>7</sup> and see the BenchmarkXPRT FAQ.<sup>8</sup> To see the reach of the BenchmarkXPRT community, see our infographic.<sup>9</sup>

### How to join

If you are not currently a community member, we encourage you to join. Registration is simple,<sup>10</sup> and does not obligate you to participate.

## WHERE CAN I GET MORE INFORMATION?

Visit us at [MobileXPRT.com](http://MobileXPRT.com) or follow us on [Twitter](#) and [Facebook](#). We announce breaking news on the [BenchmarkXPRT blog](#) (available to everyone) and the [BenchmarkXPRT forums](#) (available to members only). If you cannot find the answer to your question, or if you need help with MobileXPRT, send an email to our team at [BenchmarkXPRTsupport@principledtechnologies.com](mailto:BenchmarkXPRTsupport@principledtechnologies.com).

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<sup>7</sup> You will find a video introduction to the BenchmarkXPRT Development Community at [www.youtube.com/embed/7Cb6zGHM4Xc](http://www.youtube.com/embed/7Cb6zGHM4Xc).

<sup>8</sup> [www.principledtechnologies.com/benchmarkxpert/faq.php](http://www.principledtechnologies.com/benchmarkxpert/faq.php)

<sup>9</sup> [www.principledtechnologies.com/benchmarkxpert/around-the-world-infographic](http://www.principledtechnologies.com/benchmarkxpert/around-the-world-infographic)

<sup>10</sup> You can register at [www.principledtechnologies.com/hdxprt/forum/register.php](http://www.principledtechnologies.com/hdxprt/forum/register.php)



## CONCLUSION

We hope this paper has answered any questions you may have about MobileXPRT 2015. If you have any other questions, or if you have suggestions on ways to improve MobileXPRT, please post them on the community forum or e-mail us at [BenchmarkXPRTsupport@principledtechnologies.com](mailto:BenchmarkXPRTsupport@principledtechnologies.com). For more information, visit us at [BenchmarkXPRT.com](http://BenchmarkXPRT.com) and [MobileXPRT.com](http://MobileXPRT.com).

## ABOUT PRINCIPLED TECHNOLOGIES



Principled Technologies, Inc.  
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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.

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