BatteryXPRT for Android 2014

User manual

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Introduction

The purpose of the BatteryXPRT for Android benchmark is to reliably evaluate the battery life of Android-based devices. The benchmark provides an intuitive user interface, a runtime allowing it to be completed within one work day, and easy-to-understand results.

About the benchmark

The BatteryXPRT for Android workload is based on the tests included in MobileXPRT 2013. In addition, the workload also contains activities which are not part of MobileXPRT, and some of the tests have been altered to make them better suited to a battery-life test.

BatteryXPRT for Android is capable of running in one of three modes. It can represent a device in Airplane mode, a device connected to the Internet via Wi-Fi, or a device connected to the Internet through a cellular data connection. The Wi-Fi and Cellular modes are represented together on the benchmark's home page by the Wi-Fi/Cellular button. If a user wishes to estimate battery life while connected to the Internet, they simply need to select the Wi-Fi/Cellular button, and BatteryXPRT will use Wi-Fi or Cellular mode based on the current device settings. There is not an option to change the device connection settings from within the BatteryXPRT UI.

Note: For readability, we will refer to the mode where you select Wi-Fi/Cellular mode using a Wi-Fi connection as "Wi-Fi," and using a cellular connection as "Cellular."

- **Airplane mode**. Airplane mode requires the user to turn on airplane mode in the device settings menu. During the Web browsing and video playback portions of the benchmark, the benchmark accesses locally stored content included during the initial installation.
- **Wi-Fi mode**. Wi-Fi mode requires the device to be connected to the Internet via a Wi-Fi connection. In Wi-Fi mode, the benchmark accesses an externally-hosted Web site to obtain content for the Web browsing and video playback tests. In addition, continuous background activity during the run simulates the power draw required by common data sync tasks for email clients and resident applications.
- **Cellular mode.** Cellular mode requires the device to be connected to the Internet via a cellular data connection. In Cellular mode, the benchmark accesses an externally-hosted Web site to obtain content for the Web browsing and video playback tests. In addition, continuous background activity during the run simulates the power draw required by common data sync tasks for email clients and resident applications.

In all three modes, the benchmark will, by default, run a 45-minute workload seven times and estimate the battery life. However, BatteryXPRT for Android also allows the user to increase the number of times it runs the workload. You may also set the test to run until the battery is

exhausted. A rundown test requires more iterations of the workload to run the battery down than the standard seven-iteration test, but in all other respects is the same as the standard test.

The detailed results information for the run includes elapsed time so that testers can compare the expected battery life to the actual elapsed time if they desire. Results of the complete rundown test and the seven-iteration test should be very similar. However, because it uses a large number of iterations, the rundown test will generally have a smaller confidence interval.

Figure 1 compares workloads across the two modes. For readability, Figure 1 does not show simulated sync activity.

	Wi-Fi/Cellular mode sub-test	Airplane mode sub-test
List Scroll	Scroll a list for 1 minute.	
Video Playback	Stream a 2-minute 720p H.264 video clip from the Internet.	Play a 2-minute 1,080p H.264 video clip from local storage.
Stand by	Device goes to standby for 1 minute.	
Zoom and Pinch	Zoom and pinch an image for 40 seconds.	
Apply Photo Effects	Apply four different Photo Effects to twenty 8MP photos and save them to JPEG/WebP format.	
Stand by	Device goes to standby for 1 minute.	
Gallery Scroll	Swipe through a photo gallery for 90 seconds.	
Stand by	Device goes to standby for 1 minute.	
Detect Faces	Organize a photo album based on whether it has faces or not.	
Audio	Play an audio clip for 3 minutes.	
Browser Scroll	Browse Web pages from a remote location for 2 minutes.	Browse local (cached) Web pages for 2 minutes.
Video Playback	Stream a 2-minute 720p H.264 video clip from the Internet.	Play a 2-minute 1,080p H.264 video clip from local storage.
Create Photo Collages	Create five photo collages from twenty 8MP photos.	
Stand by	Device goes to standby for 1 minute.	
Encrypt Personal Content	Encrypt and decrypt photos, video, and an audio clip, which takes 2 to 3 minutes.	
Audio	Play an audio clip for 3 minutes.	
Create Slideshow	Create a video slideshow (720p; H.264; 20 seconds) using 20 images with different transitions and effects.	
Stand by	Device goes to standby for 1 minute.	
Grid Scroll	Scroll the list of apps on the device for 90 seconds.	

Stand by	Device goes to standby for the rest of the 45-minute cycle.

**Figure 1: Comparison of the Wi-Fi/Cellular modes and Airplane mode.**

After completing a test run, the benchmark displays a results page. The results details include estimated battery life with a 95 percent confidence interval and the performance score. Our testing shows that the benchmark's estimated battery life is very close to the battery life recorded during a full rundown test. For details about how the results are calculated, see the BatteryXPRT for Android design document.

Installing the benchmark

There are two ways to install the benchmark. BatteryXPRT can be installed from the Google Play Store or from BenchmarkXPRT.com. The installer from BenchmarkXPRT.com bundles the required content inside the installer. Below are steps for both methods of installation.

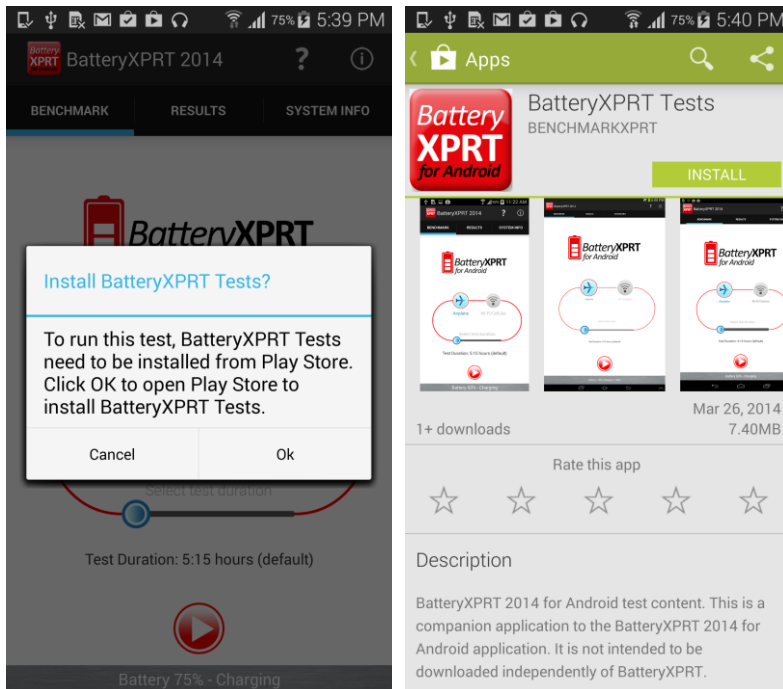## Installing the benchmark from the Google Play Store

1. Search for BatteryXPRT 2014 on the Google Play Store.
2. Once you have located the app listing, click on the install button.
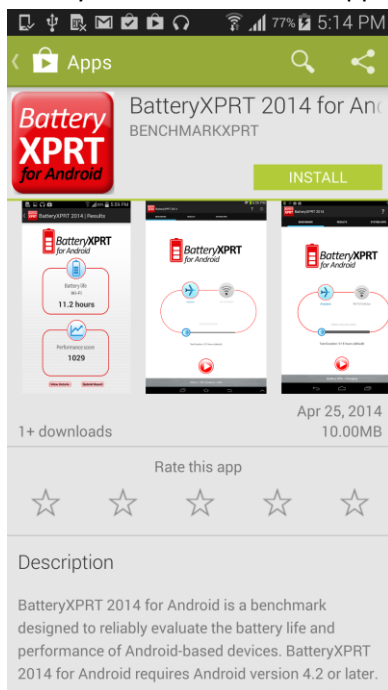
3. After the app is installed, launch the app to initiate the content download. This step may take between 5 to 10 minutes, depending on the download speed. The following message will show during the download.
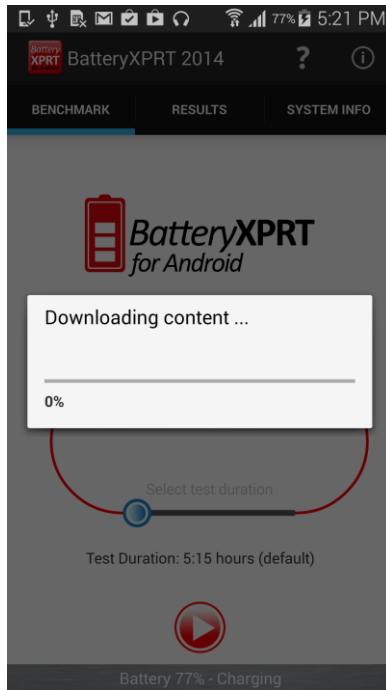
4. Once the content is downloaded, BatteryXPRT will prompt the user to install "BatteryXPRT Tests" from Play Store. Click OK to install the app. Once the BatteryXPRT Tests app is installed, click Done to close.
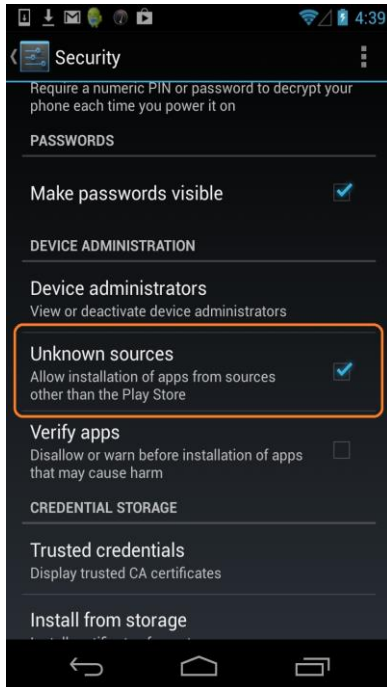
5. BatteryXPRT 2014 for Android installation is complete.
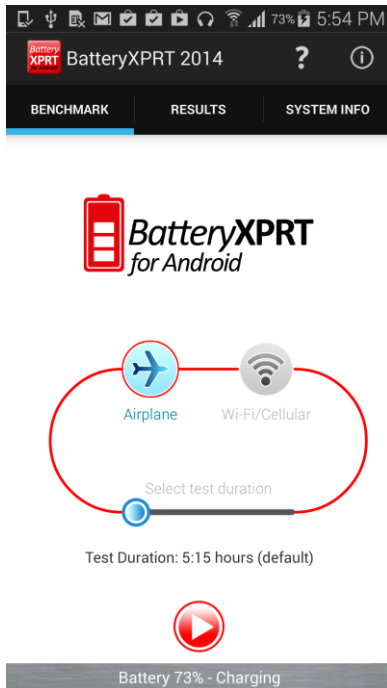
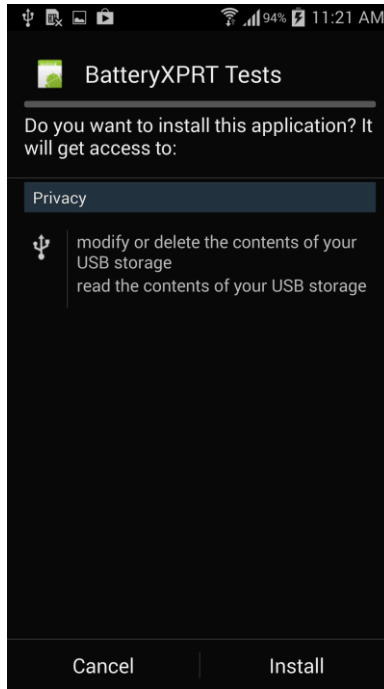# Installing the benchmark from the BenchmarkXPRT.com installer

1. Configure the test device to allow installation of apps from local storage.

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2. Go to BatteryXPRT tab in the members' area to download the BatteryXPRT installer.
3. Copy the installer APK file to /phone or /sdcard on the Android device.
4. Click on the APK file to launch the installer.
   Note: If the test device does not have a default file explorer, you may need to install a file explorer application.

5. Click Install to start installing the BatteryXPRT Installer and other components that are required for the benchmark to run.
6. After the installation completes, click Open to start the installation of required components. The screen will show a "Copying content…" notice during the installation.
7. Click Install to start installing the BatteryXPRT Tests. After the app is installed, click Done to close the app.
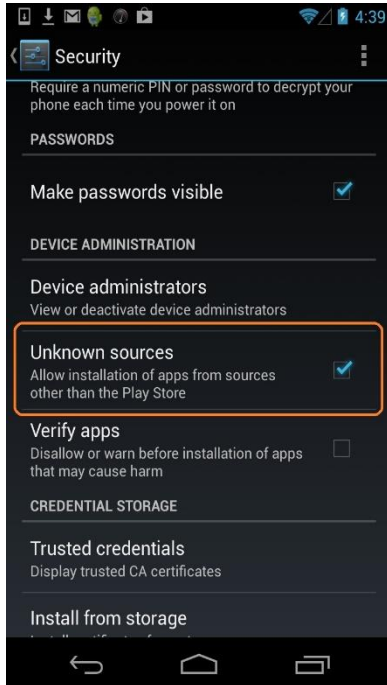
8. Click Install to start installing the BatteryXPRT 2014 for Android app. After completing the installation, click Open to start the BatteryXPRT for Android app. BatteryXPRT 2014 for Android installation is complete.
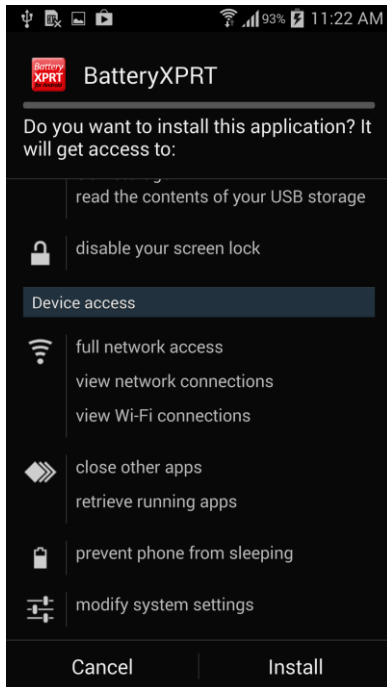
# Installing the benchmark from APKs published at BatteryXPRT.com

1. Configure the test device to allow installation of apps from local storage.

2. Download the BatteryXPRT and BatteryXPRTTests APKs from BatteryXPRT.com. The download links are directly below the Google Play store icon in the middle of the page.
3. Copy both of the APK files to /phone or /sdcard on your Android device.
   Note: If the test device does not have a default file explorer, you may need to install a file explorer application.
4. Click on the BatteryXPRTTests.APK file to launch the installer. After the installation finishes, click on "Done" to close.
   Note: It's important to install the BatteryXPRTTests APK before the BatteryXPRT APK. This prevents the benchmark from attempting to download the BatteryXPRTTests APK online.
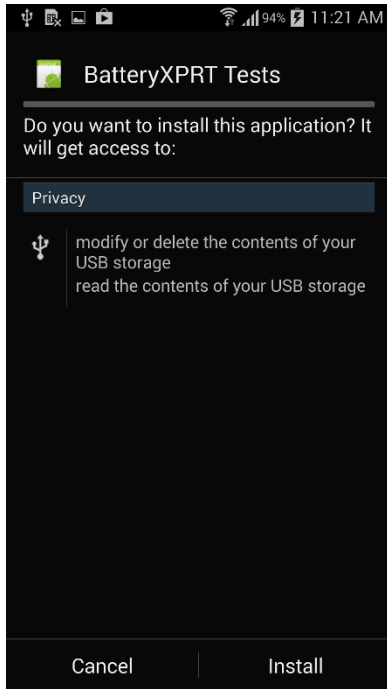
5. Click on the BatteryXPRT.APK file to launch the installer.
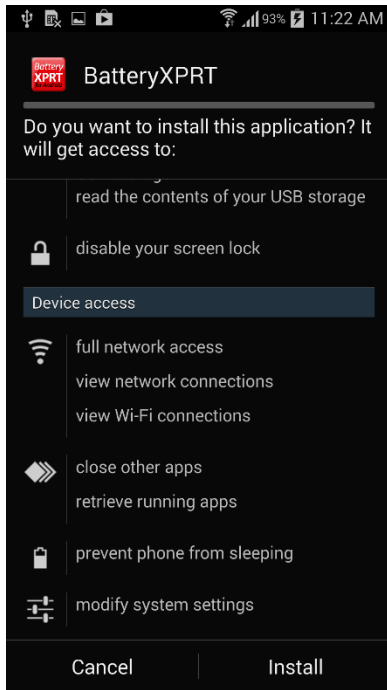
6. After the app is installed, launch the app to initiate the content download. This step may take five to 10 minutes, depending on the download speed. The benchmark will display a progress bar during the content download process.
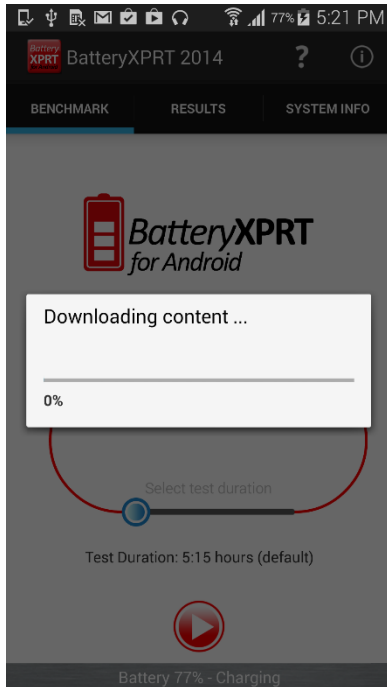
7. When the content download is complete, BatteryXPRT is ready to test.

Configuring the test device

The following test device configuration steps are recommended for reliable results using BatteryXPRT:

- Set the display brightness to 200 nits.
- Connect a set of ear-fitting headphones (with sensitivity of ~100 dB/1mW) to the audio port and set the noise level to 75 dB.
- Charge the battery of the device to 100 percent.
- Go to Settings | Display | Daydream, and turn Daydream OFF (Android 4.4 KITKAT only).
- Make sure any system or app update messages are addressed or dismissed completely (update notices may interrupt the benchmark run).
- Make sure to close all running apps. To do this, click on the recent apps menu item and remove all apps from the list.
- Disconnect the device power adapter.
- Set the proper connectivity configuration:
  - Wi-Fi/Cellular mode
    - Turn on Wi-Fi or Cellular connection.
    - If using Wi-Fi:
      - Connect to a wireless access point.
      - Make sure the Wi-Fi signal strength is around -45 dBm.
      - Make sure the device is a minimum of 5 ft. from the router.

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- Disable Bluetooth and NFC connectivity.
- Test the connection by connecting to a known Web site using an Internet browser.
  - o Airplane mode
    - Turn on Airplane mode.
    - Disable Bluetooth, Wi-Fi, and NFC.

If testing a Lenovo K900 with an Atom Z2580 processor

On this device, BatteryXPRT does not exit standby mode, and test runs will not complete successfully. To fix this issue, adjust the following settings to allow the device to exit standby when necessary:

1. Go to Settings | Feature Settings.
2. Select the System wake-up control option.
3. Choose the BatteryXPRT and BatteryXPRT Tests apps.

Testing instructions

Before starting the test, please make sure the device is prepared according to the steps listed in the Test Device Configuration section. These steps are necessary in order to produce reliable numbers comparable to results from other devices.

After launching the BatteryXPRT app, perform the following steps:

1. Select Airplane mode or Wi-Fi/Cellular mode, according to the test you wish to run.
2. Disconnect the device from its power adapter.
3. Verify that the current battery capacity is at least 95 percent.
4. Click the red Start button to begin the test. For the default seven-iteration test, it takes approximately 5 hours and 15 minutes to complete the run and present the test results.
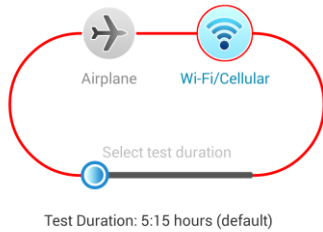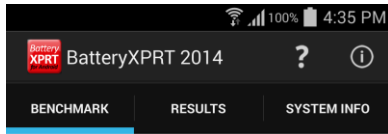
After a successful run, the test shows a results screen.

## Running with more than seven iterations

BatteryXPRT for Android provides the ability to run the test for more than seven iterations. Using this approach, a user can choose to set the test duration to a time longer than the expected battery life for the device. Currently, rundown mode allows users to select up to 30 hours of run time.

To run the test longer than the default seven iterations (5:15 hours), use the slide bar to set the intended duration of the run. When set to the maximum allowed duration, the benchmark will run the test until the desired duration is reached or the device runs out of battery power, whichever comes first.

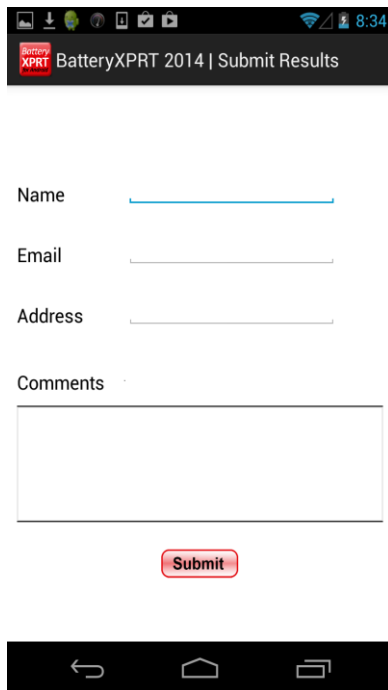BenchmarkXPRT Development Community

Results

At the end of a successful test, results are automatically displayed. The results show the performance-qualified battery life.
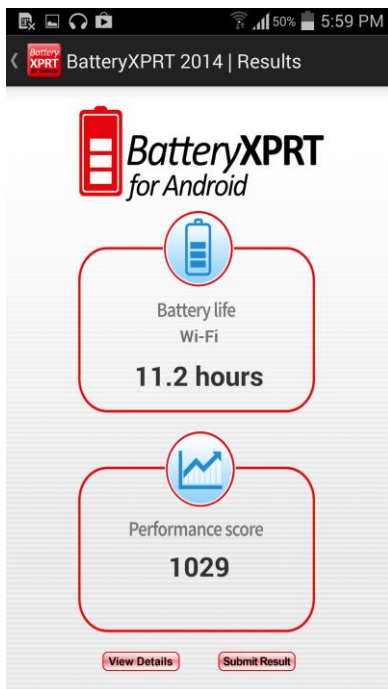
Results for all successful previous tests are archived on the test device, and can be accessed by clicking the Results tab on the main screen.

Submitting results
BatteryXPRT 2014 for Android allows you to submit results to Principled Technologies. Simply click the Submit Result button on the result screen. Fill in a contact name and e-mail address. The address and comment fields are optional. Then, all you have to do is click submit.

Important note: Never compare results from one mode to results from a different mode. Your device will use different amounts of power depending on whether it is accessing the Internet, and whether the Wi-Fi is enabled.

Uninstall
BatteryXPRT can be uninstalled from the device Application Manager. The BatteryXPRT Tests component must be uninstalled separately from the Application Manager.

OS versions
BatteryXPRT is designed to run on devices with Android 4.2 and above.

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