



# BAPCo® MobileMark® 2018 User Guide

Revision: 1.7

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## Introduction

MobileMark<sup>®</sup> 2018 is an application-based, performance-qualified battery life benchmark designed to assist users in making PC purchasing decisions.

## Setup

Before attempting to install or run MobileMark 2018, verify that the test system meets the recommended minimum system configuration for running the benchmark.

- **CPU:** 1.5 GHz AMD<sup>®</sup> or Intel<sup>®</sup> dual-core processor
- **RAM:** 4 GB
- **HDD/SSD:** 25 GB of free space on the primary drive
- **Operating System:** Microsoft<sup>®</sup> Windows<sup>®</sup> 10 64-bit
- **Resolution:** 1280x800 or 1366x768
- **Graphics:** DirectX 10 compatible
- **Network:** Associate to Wi-Fi network, without Internet access

## Image configuration

For best results, MobileMark 2018 should be installed to a clean instance of a supported operating system, with updated hardware drivers. See the Applications section for a list of application software installed by the benchmark. MobileMark 2018 includes an integrated configuration tool that will automate making changes to the system in preparation for running the benchmark. See the [SYSTEM CONFIGURATION TOOL](#) section for more information on image configuration.

- **Administrative rights:** An account with administrative privileges is required. The same account must be used to install and run MobileMark 2018.

## Microsoft Office Removal

MobileMark 2018 installs a copy of Microsoft Office 2016. All traces of Office, including UWP Office app and/or Office 365 installations must be removed from the system before attempting to install MobileMark 2018. Neglecting to remove an existing Office installation will cause installation failures.

Follow the instructions at the [Microsoft Office removal tool](#) page to remove your version of Office.

Remove any Office UWP apps

- Open PowerShell as administrator: Hit Windows+X, and then choose the “Windows PowerShell (Admin)” option from the Power User menu.
- At the PowerShell prompt, type the following command and press Enter after each command to remove pre-installed apps that may interfere with benchmark execution on the system under test:
  - `Get-AppxPackage *officehub* | Remove-AppxPackage`
  - `Get-AppxPackage *OneNote* | Remove-AppxPackage`
  - `Get-AppxPackage *Office* | Remove-AppxPackage`

## MobileMark<sup>®</sup> 2018 installation

**Please use disk image software to make a backup of the disk prior to installation of MobileMark 2018. Although uninstallation is supported, BAPCo recommends making a backup of your image before installing MobileMark 2018.**

Please be sure the test image is free of any known conflicting software before attempting installation. This list includes but may not be limited to any of the applications that will be installed by the benchmark. See the [APPLICATIONS](#) section for the list of applications that MobileMark 2018 installs and/or uses.

Follow these steps to install MobileMark 2018:

- 1) Download MobileMark 2018 from the BAPCo store.
  - a. Make a backup copy of the download zip to a USB key or other external drive for safe keeping.
- 2) Unpack the benchmark files.
  - a. Create a folder called MobileMark2018 and unpack the contents of the store download.
- 3) Using Windows Explorer, navigate back to the Disc1 folder created in Step 2.
- 4) Double click on the file named MobileMark2018\_setup.exe and follow the prompts to complete the installation.

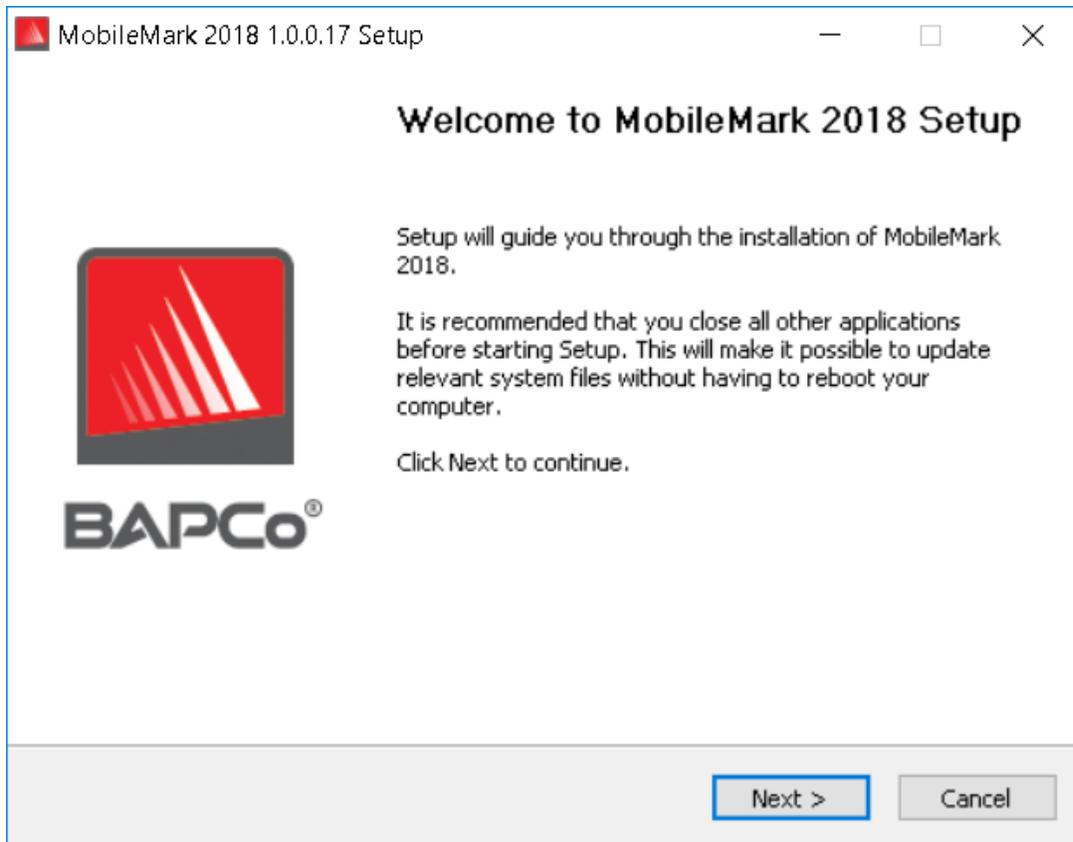


Figure 1: MobileMark 2018 installer window

Read and accept the BAPCo software EULA by clicking the option 'I accept the terms of the License Agreement', then click 'Next'.

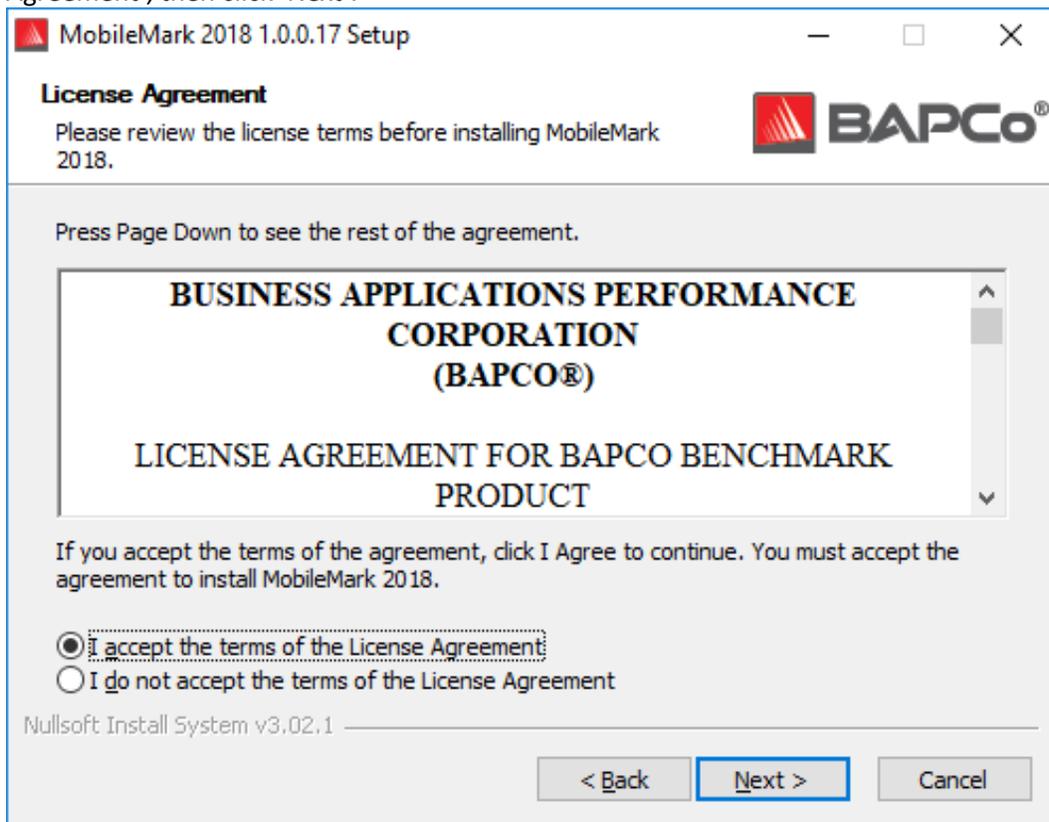
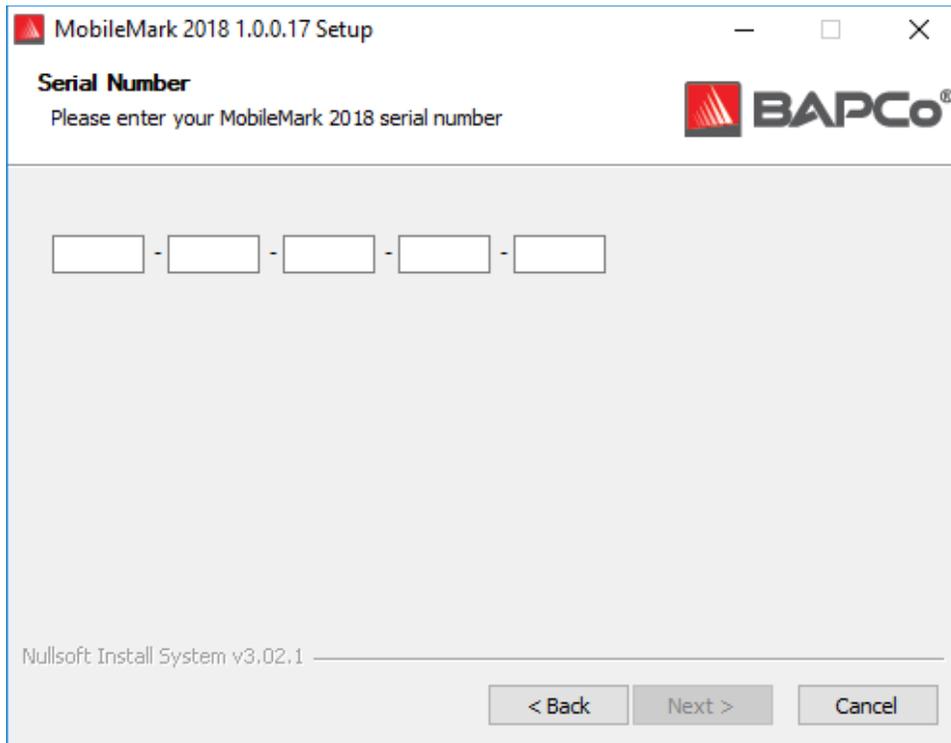


Figure 2: MobileMark 2018 EULA

Enter the serial number provided with the benchmark package and click 'Next' to continue.



MobileMark 2018 1.0.0.17 Setup

**Serial Number**  
Please enter your MobileMark 2018 serial number

[ ] - [ ] - [ ] - [ ] - [ ]

Nullsoft Install System v3.02.1

< Back    Next >    Cancel

Figure 3: Enter a valid MobileMark 2018 serial number to proceed with installation.

Figure 4 shows the default full installation of the benchmark. All core components, all scenarios and the results browser will be installed when the user clicks 'Next'.

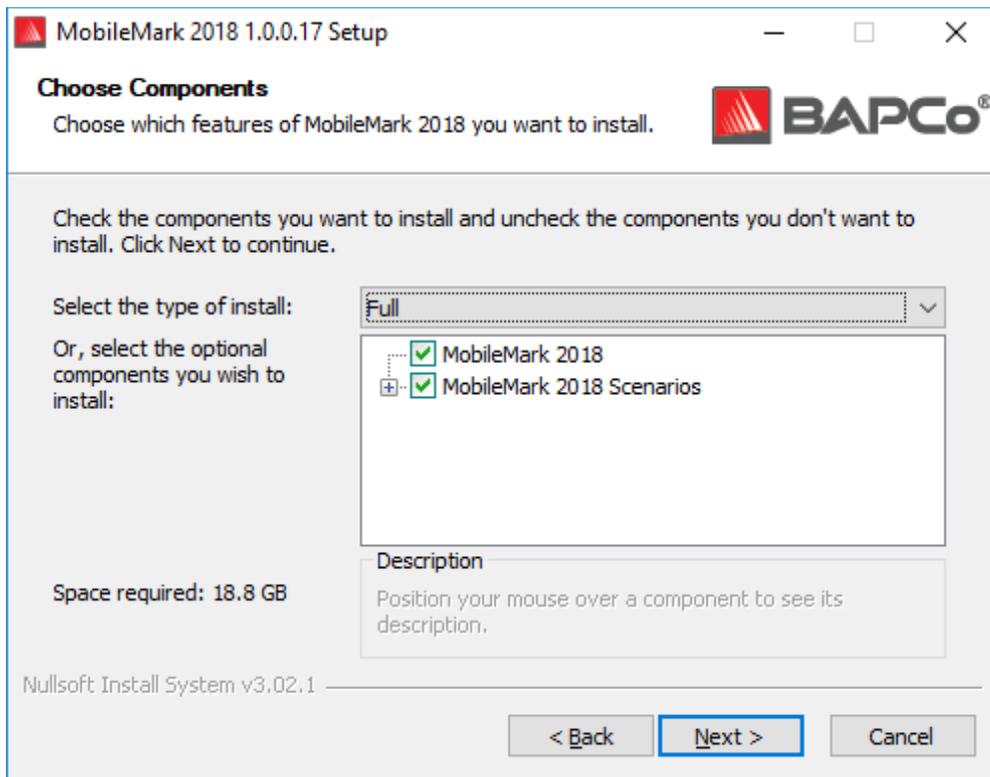
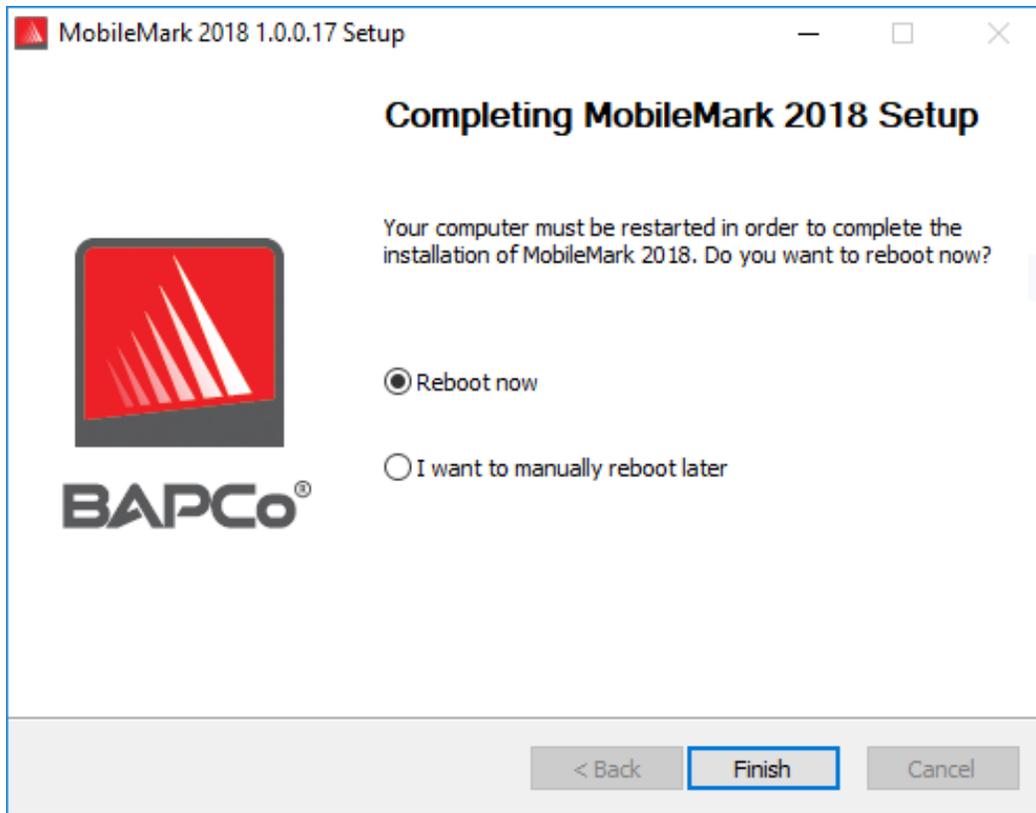


Figure 4: Default full install of MobileMark 2018



*Figure 5: Installation of MobileMark 2018 has completed successfully*

Once installation has completed, please reboot the system before attempting to run MobileMark 2018.

## **Uninstallation**

MobileMark 2018 can be uninstalled by navigating to the Programs and Features item in the Windows Control Panel. Choose the MobileMark 2018 icon from the list of applications and select 'Uninstall'.

Due to DRM limitations of some of the applications in MobileMark 2018, once the benchmark is uninstalled, it cannot be reinstalled back to the same system image.

## Running MobileMark<sup>®</sup> 2018

Start MobileMark 2018 by double clicking the desktop short cut to launch the main interface as illustrated in Figure 6 below.

**Important:** If User Account Control has not been previously disabled, right-click the icon and choose 'Run as administrator'. UAC can then be disabled using the integrated configuration tool. More information on the integrated configuration tool is available in the [SYSTEM CONFIGURATION TOOL](#) section. MobileMark 2018 must be run under the same user account that was used to install it.

Note: MobileMark 2018 may also be launched via command line. See [AUTOMATED EXECUTION](#) section for more details.



Figure 6: MobileMark 2018 interface.

### MobileMark<sup>®</sup> 2018 interface

MobileMark 2018 includes a redesigned user interface, which has been streamlined to simplify project configuration. Just click 'Run Benchmark' to launch a benchmark run with the default configuration, which will do the following:

- Run one iteration of all three scenarios.
  - The project name will be 'project01' for the first project. Subsequent projects will be named 'project02', 'project03', and so on.
- Conditioning run will be executed, but will not be part of the performance score calculation.
- 'Process idle tasks' is set to OFF.
- The system configuration tool will execute with the following options:
  - Required items – set to ON
  - Recommended items – set to ON
  - Optional items – set to OFF

## Windows 10 Performance/Power slider

The Windows 10 Performance/Power slider has four positions (Best battery life, Better battery, Better performance, and Best performance) that can be used in MobileMark 2018 testing.

The Performance/Power slider is only available if the system under test is configured with the Balanced power plan, or a custom power plan was created using the Balanced power plan template.

Refer to the [MOBILEMARK 2018 BENCHMARKING RULES](#) section for additional information about testing devices with the Performance/Power slider and Battery saver mode.

Steps for running in Better battery, Better performance, or Best performance:

- 1) Unplug the SUT from AC power.
- 2) Click on the battery icon in the systray to access the Performance/Power slider.
- 3) Select the desired slider position.
- 4) Reconnect AC power.
- 5) Verify the power slider position is set as desired by unplugging the SUT and clicking on the battery icon in the systray. The slider should be set to the position from step 3.
- 6) Reconnect AC power.
- 7) Launch MobileMark 2018 GUI and start the test.

Steps for running in Best battery:

- 1) Right click the start menu and select power options > battery.
- 2) Be sure the option 'Turn on battery saver automatically if my battery falls below:' is checked.
- 3) Set the battery saver threshold percentage to 100%.
- 4) Unplug the system from AC power.
- 5) Click the battery icon in the systray and verify the slider is set to 'Best battery life'.
- 6) Reconnect AC power.
- 7) Launch the MobileMark 2018 GUI and click the settings icon to bring up the config tool.
- 8) On the Recommended tab, turn off the setting 'Verify Battery Saver Threshold'.
- 9) Go back to the main MobileMark 2018 window and click the 'Run benchmark' button to start the test.



## **Results generation and display**

The MobileMark 2018 user interface will display the results of the most recently run project in the main benchmark windows. If MobileMark 2018 has been launched after a new installation, no results will appear until a run has been successful completed.

### **Viewing additional results**

MobileMark 2018 results are saved as a PDF document in the Results folder located on the desktop of the system under test. Use Google Chrome installed by MobileMark 2018 in order to view the contents of the PDF. Each PDF file also includes an embedded .XML attachment which contains additional details about the system under test. A standalone PDF reader such as Adobe Acrobat or Foxit PDF must be used to view the XML, as PDF attachments are not currently supported by Chrome's PDF viewer.

## Results submission

Users may submit results in the following ways:

### Submit from MobileMark 2018

- Click the 'Submit Results' button on the MobileMark 2018 main window to submit the most recent FDR.
- Fill in the submission form dialog and click submit.
- Note: If no results are displayed in the main window, no information will be sent to BAPCo.

### Submit results by web browser

PDF results files may also be submitted through the web browser via drag and drop at [results.bapco.com/upload](https://results.bapco.com/upload). To upload results by drag and drop, perform the following steps:

- Locate the PDF files to be submitted
- Navigate to [results.bapco.com](https://results.bapco.com) and click the 'Submit results' option in the menu on the left of the web page
- Complete the information (Name/company, email address, and configuration notes, if desired).
- Drag and drop the files on to the page, or click 'Add files' and browse to the folder containing the PDFs for upload. Click 'Start upload'.
- An email will be sent to the provided email address with a link to view the status of the submission. Results will take up to 10 days to be publicly viewable.

## Automated installation

MobileMark 2018 may be installed through the command line. The following command line switches are available:

- /S - silent install, no GUI
- /SN <serial number> - pass serial number to the installer

To install MobileMark 2018 from the command line, open a command prompt, change to the directory where the MobileMark2018\_Setup.exe file is located and issue the following command, replacing <1234567891234567891234567> with the 25 digit serial number provided at time of purchase. Do not separate the serial number with dashes or spaces on the command line.

Example command for unattended installation

```
C:\>start /wait MobileMark2018_Setup.exe /S /SN <1234567891234567891234567>
```

## Installer exit codes

When complete, the installer will return an exit code (stored in %ERRORLEVEL%). See below for the exit codes and their meanings:

- 0 - Success
- 3010 - Success, reboot required
- 1 - Installation abort by user
- 2 - General installation problem
- 3 - Missing or invalid serial number
- 4 - The following applications must be uninstalled before installing MobileMark 2018
- 5 - MobileMark 2018 (64-bit) can only be installed on 64-bit machines
- 6 - MobileMark 2018 installer is already running
- 7 - Installer must be run from the top level installer: MobileMark2018\_Setup.exe
- 8 - Disc 2 version does not match the version in Disc 1
- 9 - Application installation missing. Invalid installation. Please uninstall and reinstall MobileMark 2018
- 10 - Installation directory must be less than 145 characters.
- 11 - Installer cannot find Disc2 media (or folder)

## Automated execution

MobileMark 2018 also supports execution from the command line. Supported command line parameters are provided in the list below. The MobileMark 2018 GUI will launch if there are syntax errors in the command line text.

-p or --project	Specifies the name of the project. This option determines if the GUI is presented to the user, or if the benchmark runs silently. If this option is supplied, it is assumed that the GUI should not appear.
-nc or --noconditioning	Turns off system conditioning run.
-ep or --processIdleTask	Turns on process idle tasks.
-h or --help	Displays the help screen.
-v or --verbose	Turns on verbose mode.
-sc or --system config = <str>	Enables or disables system config tool options on the command line (see section <a href="#">SYSTEM CONFIGURATION FROM COMMAND LINE</a> for more information)

The example command below will launch MobileMark 2018 with the default system configuration items, create a project called 'test\_project' and will turn on process idle tasks.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -ep
```

## Automated data collection

MobileMark 2018's workload manager allows the user to execute scripts to aid in the processing of results at the conclusion of a run. Placeholder scripts are included with each installation in the C:\Program Files (x86)\BAPCo\MobileMark2018\Automation\ directory.

Unplug.bat is executed when MobileMark 2018 prompts the user to unplug the system under test, prior to starting the battery run down.

ProcessResults.bat is executed at the conclusion of a successful run of MobileMark 2018. Users can add commands to this script to copy results to a new location, or call additional commands specific to their environment.

ProcessError.bat is executed if MobileMark 2018 exits with an error condition. Insert commands to this script to do things such as copying error logs to a new location, or call other commands for post processing of errors.

## Benchmark settings

Users can access additional benchmark settings by clicking the settings button as indicated by the red arrow in Figure 7.



Figure 7: MobileMark 2018 settings button

Clicking the 'Settings' button as indicated by the red arrow in Figure 7 above will bring up the detailed settings window as shown in Figure 8 below. From this window, users may change the default number of iterations, specify a project name, disable the conditioning run, disable the energy test, and make changes to the configuration tool options. See the next section, [SYSTEM CONFIGURATION TOOL](#), for more information.

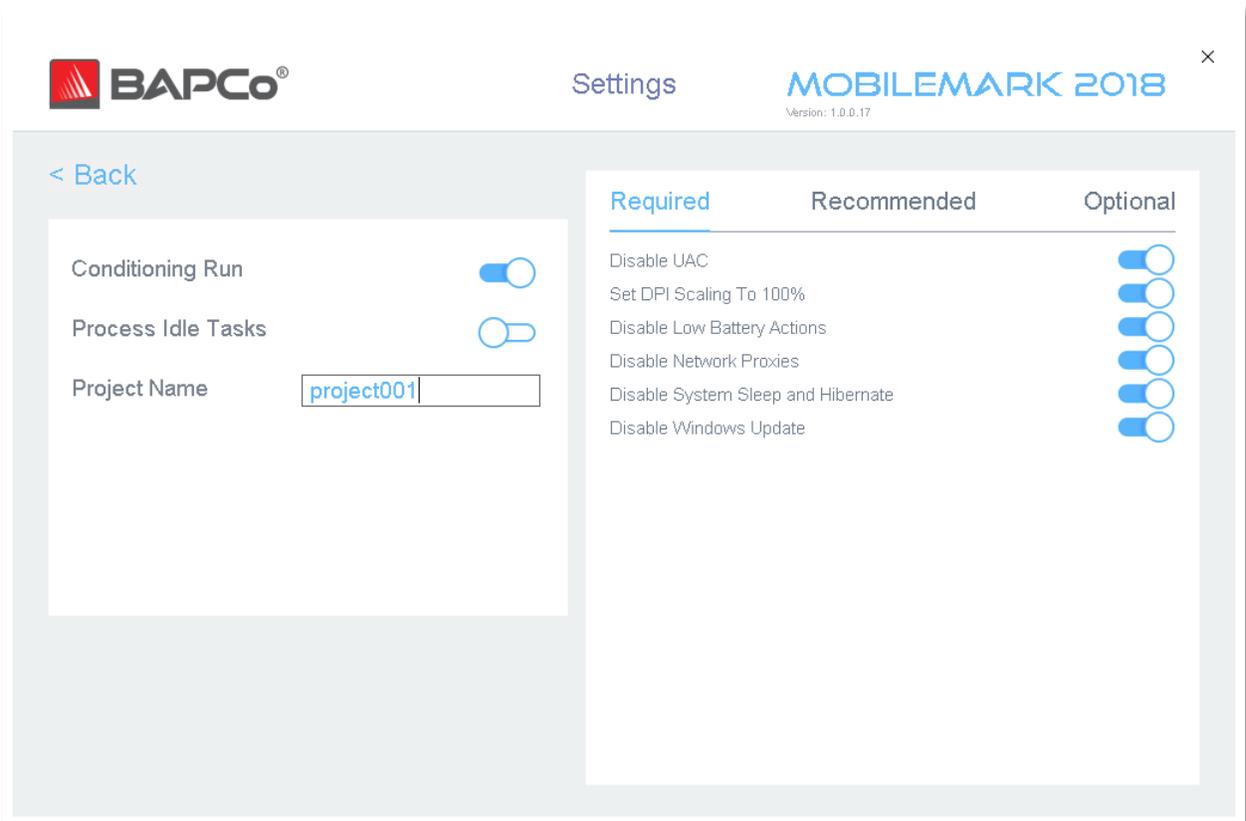


Figure 8: MobileMark 2018 configuration options on Windows 10

## System Configuration Tool

The configuration tool runs automatically at the start of each test, and records the state of each item on the system under test prior to modifying it for benchmark execution. At the conclusion of the run, each modified setting will be returned to its previous state.

By default, the configuration tool sets the Required and Recommended items as described below. Optional items are not set by default.

Users may modify the default items by clicking on the settings icon and navigating the Recommended or Optional configuration tabs. Note that Required settings cannot be disabled via the GUI.

If additional control of the system configuration items is required, please refer to the section [SYSTEM CONFIGURATION FROM COMMAND LINE](#).

The following is a list of configuration options with their priorities that can be applied using the System Configuration tool. Some items may apply only to certain supported operating systems, as noted in the

item's description. An example command line string for each configuration item is also included in the description.

## **Required**

Make configuration changes that are required for the benchmark to run. These items are enabled by default, and cannot be disabled.

### **Disable User Account Control (UAC)**

Disables User Account Control to prevent Administrator elevation prompts from appearing during benchmark runs. The system must be rebooted to apply this change.

### **Set DPI scaling to 100%**

Sets the desktop scaling to 100%. Prevents failures on higher resolution displays.

### **Disable Low Battery Actions**

Prevents the system from shutting down or from posting a warning when the battery reaches the low level.

### **Disable Network Proxies**

Disables proxy server configuration for Internet connection settings.

### **Disable System Sleep and Hibernate**

Prevents the system from going to sleep or hibernating and disables the "Require password on wake" setting.

### **Disable Windows Update**

Disables the Windows Update service.

### **Enable Windows Search**

Makes sure that the Windows Search service is enabled and running.

## **Recommended**

Make configuration changes that are recommended in order to obtain repeatable scores, and minimize the occurrence of errors. Recommended items are enabled by default. Recommended items may be disabled by clicking the slider next to the configuration item or using the command line option.

### **Create BAPCo Power Scheme**

Creates a new power scheme named "BAPCo MobileMark 2018" based on the system's currently active power scheme. If applied, all subsequent power profile configuration changes will be applied to the newly created power scheme. If this option is not enabled, all power profile configuration changes will be applied to the currently active power scheme.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=PowerScheme= on|off"
```

#### **Set Power Plan Type to "Balanced"**

Sets the "Power Plan Type" option (sometimes referred to as "Power Plan Personality") of the active power scheme to "Balanced". This setting tags the active power plan with an overall personality that favors energy savings. Drivers and applications may query this setting to determine their respective performance vs energy savings behavior. This option may be used whether or not the "Create BAPCo Power Scheme" option is checked. If "Create BAPCo Power Scheme" is not enabled, "Set Power Plan Type" will be applied to the currently active power scheme.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=PowerPlan= on|off"
```

#### **Set CPU Adaptive Mode**

Sets the minimum CPU performance state to 5% and the maximum value for CPU performance state to 100% on both AC and DC power.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=SetCPUAdaptiveMode= on|off"
```

#### **Disable Battery Saver Dimming**

Disables screen dimming when Battery Saver is engaged.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=DisableBatterySaverDimming= on|off"
```

#### **Verify Battery Saver Threshold**

Sets the battery saver threshold to less than or equal to 20%. Leave this option on unless testing with Windows 10 Performance/Power slider in the 'Best Battery' position. [REFER TO THE WINDOWS 10 PERFORMANCE/POWER SLIDER](#) section for more information.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=VerifyBatterySaverThreshold= on|off"
```

#### **Disable Disk Defrag**

Disables the Defrag scheduled task.

"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test\_project -sc=  
DiskDefrag= on|off"

#### **Disable Windows Error reporting**

Prevents the Windows Error reporting tool from presenting error reporting windows.

"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test\_project -sc=  
ErrorReporting= on|off"

#### **Disable Windows Lock screen**

Disables the lock screen to prevent it from blocking application input.

"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test\_project -sc=  
DisableLockScreen= on|off"

#### **Disable Windows Pop-ups**

Disables all pop up notifications (Balloon tips) in the systray (Windows 7 only).

"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test\_project -sc=  
WindowsPopUps= on|off"

#### **Disable Screen Saver and Monitor Timeout**

Turns off the screen saver. Disables display timeout in the power profile for both AC and DC options.

"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test\_project -sc=  
ScreenSaver= on|off"

#### **Disable Windows Sidebar/Gadgets**

Turns off Gadgets.

"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test\_project -sc=  
WindowsSideBar= on|off"

#### **Disable Desktop Slide Show**

Prevents the desktop background from changing

"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test\_project -sc=  
DesktopSlideShow= on|off"

#### **Disable Windows Defender**

Sets Windows Defender to disabled.

"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test\_project -sc=  
WindowsDefender= on|off"

### **Disable Windows Firewall**

Configures the Windows firewall to allow all inbound/outbound traffic on Windows 10.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=  
DisableWindowsFirewall= on|off"
```

### **Set Font Smoothing**

Turns on Windows font smoothing.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=  
SetFontSmoothing= on|off"
```

## **Optional**

Make configuration changes that are typically not needed to obtain repeatable scores, but which may be needed in some rare cases. Optional items are not enabled by default.

### **Disable Hard Disk Timeout**

Prevents the hard disk from going to sleep.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=  
HardDiskTimeout= on|off"
```

### **Disable System Restore**

Disables Windows system restore.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=  
SystemRestore= on|off"
```

### **Ignore Laptop Lid Close**

Prevents the system from going to sleep if the lid is closed during a benchmark run.

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=  
LaptopLidClose= on|off"
```

## **System configuration from command line**

When running MobileMark 2018 from the command line, the system configuration items will be set according to their defaults unless the user specifies options on the command line.

Example:

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=  
PowerScheme= Off"
```

The above command will execute the benchmark in a project called 'test\_project' and run the defaults of one iteration plus the conditioning run. The 'Create BAPCo Power Scheme' option in the configuration tool will be set to 'Off'. MobileMark 2018 will not create the BAPCo Power scheme before modifying the system configuration for the test.

For cases where users do not want to set any system configuration items, all the system configuration items must be specified as set to 'Off' on the command line.

The Recommended and Optional config tool items can be toggled with "--sc all=On|Off", which will allow the user to disable all the system configuration options without having to specify each item on the command line. Configuration items listed as Required cannot be disabled.

## Benchmark Usage

This subsection describes the behavior of MobileMark 2018 during the execution of a benchmark run.

### Best Practices

In order to obtain reliable, reproducible results, BAPCo recommends using the default settings in the MobileMark 2018 interface. To run with the default settings, just launch MobileMark 2018 and click 'Run Benchmark'.

- Conditioning run enabled
- Process idle tasks disabled
- Performance slider set to 'Best performance' while on DC power
  - Changes to the performance slider must be made while on DC power. Configuring the slider on AC power will not change the setting for DC power.
- Display brightness must be set to 200 nits on DC power. See the [BENCHMARKING RULES](#) section for additional details.
- When using BAPCo benchmarks to evaluate performance or battery life, one should install the latest production drivers from the hardware manufacturer. Drivers included with the operating system may not be device specific or newer drivers may be available from the device manufacturer. Using incorrect drivers could result in significantly reduced performance

### Heads Up Display (HUD)

The Heads Up Display appears in the upper right corner of the desktop and provides information about the currently running project.



Figure 11: MobileMark 2018 HUD.

### Process idle tasks

Prior to executing benchmark workloads, the MobileMark 2018 workload manager will pause for 120 seconds to allow the system to stabilize. When the 120 seconds have elapsed, the workload manager will issue the process idle tasks command, if this option was selected. When the idle tasks queue is cleared,

the benchmark workload will begin. Note: Process idle tasks completion time can vary from system to system.

### **Keyboard/mouse input blocking**

Once workload execution begins, the workload manager will lock the system to prevent accidental input from the mouse or keyboard from disrupting the workload automation. The workload manager will continue to execute the selected scenarios for the current project, and will display the results at the successful conclusion of the run. Refer to the [STOPPING A RUN IN PROGRESS](#) section below for additional information on keyboard and mouse input blocking.

### **Error handling**

By default, when MobileMark 2018 encounters an error during the execution of a project, the workload manager will log the error and then reboot the system as long as there is still charge remaining. If the battery is exhausted, the system will shut down and MobileMark will recover at the next reboot.

MobileMark 2018 allows further control of error handling timeouts through the BENCHMARK\_TIMEOUT\_MULT environment variable. This variable can be configured to increase the amount of time a benchmark script waits before throwing an error and either attempting a retry or halting the run. The default value for BENCHMARK\_TIMEOUT\_MULT is 1.0. Increasing the value to 2.0 doubles the error handling timeout, 3.0 triples the timeout, and so on.

### **Stopping a run in progress**

If it becomes necessary to stop a benchmark run in progress, follow these steps:

1. Press the CTRL-ALT-DEL keys at the same time to bring up the Windows change password screen.
2. Click 'Cancel' to return to the desktop.
3. Keyboard and mouse input should now be enabled.
4. Navigate to the systray in the lower right corner of the screen and find the BAPCo icon, as shown below.
5. Right click the icon and choose 'Stop'.



*Figure 13: BAPCo systray icon. The green triangle indicates MobileMark 2018 is running.*

## Reference system

MobileMark 2018 performance scores are normalized using a reference system. The reference system scores '1000' on each of the three scenarios, and on the overall MobileMark 2018 performance qualification. The battery life of the system under test is also reported in hours and minutes. The reference system configuration is listed below.

### Lenovo<sup>®</sup> ThinkPad<sup>™</sup> T480s

- CPU: Intel<sup>®</sup> Core<sup>™</sup> i5-8250U processor @ 1.60 GHz
- Graphics: Intel HD Graphics 620
- Resolution: 1920x1080
- Display Brightness: 200 nits
- OS build version: Windows 10 RS4 build 10.0.17134.228 (64 bit)
- RAM: 1 X 8 GB (Single Channel)
- Storage: 256 GB Solid State Drive, PCIe-NVMe OPAL2.0 M.2

## Applications

The following applications (grouped by scenario) are installed and/or used by MobileMark 2018. Some applications appear in multiple scenarios, but only one instance of the application is installed.

### Productivity

- Adobe<sup>®</sup> Acrobat<sup>®</sup> Pro DC
- AutoIT 3.3.14.2
- Google Chrome<sup>™</sup>
- Microsoft<sup>®</sup> Excel<sup>®</sup> 2016
- Microsoft<sup>®</sup> OneNote<sup>®</sup> 2016
- Microsoft<sup>®</sup> Outlook<sup>®</sup> 2016
- Microsoft<sup>®</sup> PowerPoint<sup>®</sup> 2016
- Microsoft<sup>®</sup> Word<sup>®</sup> 2016
- Windows Zip

### Creativity

- Adobe<sup>®</sup> Photoshop<sup>®</sup> CC 2017
- Adobe<sup>®</sup> Lightroom<sup>®</sup> Classic CC
- CyberLink PowerDirector<sup>®</sup> 2015

### Web Browsing

- Google Chrome<sup>™</sup>
- Microsoft Movies & TV

## Scenarios

MobileMark 2018 scenarios and workload descriptions are provided below.

### **Productivity**

The Productivity scenario models productivity usage including word processing (mail merge, document comparison, and PDF conversion), spreadsheet data manipulation (data modeling, financial forecasting), email creation/management, presentation editing, software development (compiling code), application installation, and archiving files.

### **Creativity**

The Creativity scenario models editing digital photos (creating HDR and panoramic photos), cataloging digital photos (organizing catalog, use of facial detection to group people), and editing digital video (create a timeline from various source clips and transcode the output).

### **Web Browsing**

The Web Browsing scenario uses Google Chrome to browse 26 local web pages. Microsoft Movies and TV is used for full screen local video playback of an 8 minute, 4k video clip @ 24 fps.

## Support

Technical support for MobileMark 2018 is provided on the web at <https://bapco.com/support> and via email at [support@bapco.com](mailto:support@bapco.com). When contacting support please include the following information.

- MobileMark 2018 version, e.g. 1.0.0.123
- System configuration information
- Step by step instructions for reproducing the problem
- Rate of error, e.g. 100%, 50%
- Archive of the benchmark error logs from the failing run
  - Locate the installation folder, for example: C:\Program Files (x86)\BAPCo\MobileMark2018\Config
    - Copy the MobileMark2018.db file
  - If reporting a problem with installation, locate the benchmark installation logs:
    - %TEMP%\MobileMark2018\_Disc1.log
  - Archive the database file and the logs listed above using WinZip, WinRAR, etc.
  - Attach the archive file to the support request email sent to BAPCo support, or please upload the archive file through the form at <https://bapco.com/support>
  - When reporting multiple errors, please include a description for each problem being reported

# MobileMark<sup>®</sup> 2018 Benchmarking Rules v1.6

This document describes the rules governing publication of results derived from running the BAPCo MobileMark 2018 benchmark. Any licensee who wishes to publish such results is obliged to adhere to all rules and regulations described in this document or other documents provided by BAPCo related to execution and reporting of MobileMark 2018 benchmark results. BAPCo reserves the right to change the rules outlined in this document at any time. Licensees are encouraged to consult BAPCo website at [www.bapco.com](http://www.bapco.com) for the latest information regarding execution and publication rules. For more information please consult the Software License Agreement.

## Benchmark Execution

### Workload Manager

All benchmarks must be run using the MobileMark 2018 Workload Manager. This utility is an executable program that runs the MobileMark 2018 benchmark. It also includes a module that generates the final benchmark results for the system under test. All published results must be derived only from a complete and correct run of the benchmark. All tests must be performed without modification to any part of the MobileMark 2018 software.

The collective set of hardware and software used in generation of an official MobileMark 2018 result must be available to the public as defined by BAPCo's availability criteria. The following specific rules apply:

### Operating System

The operating system used to generate and publish results must be a publicly available release from the original software vendor. Consult the product manual at [www.bapco.com](http://www.bapco.com) for the current list of supported operating systems. Upgrade of specific drivers that are released and maintained by vendors other than the operating system vendor (e.g. graphics drivers, disk drivers, motherboard setting files, multimedia drivers) is allowed provided these drivers are publicly available, release-quality drivers from original vendors of such drivers. Licensees may also use operating system service packs, API updates (e.g. Direct X) and other such updates provided they are publicly available, release-quality software from the original vendor, and that they meet the benchmark's Operating System requirements. Licensees should also consult license agreements from individual software vendors to ensure compliance with vendor benchmark restrictions.

### System Configuration

To ensure the integrity of MobileMark 2018 results, test systems must maintain the same hardware configuration and software settings throughout the execution of the test. Any modification to hardware configuration and/or software settings will invalidate the results

## **Hardware**

The system hardware used to generate official MobileMark 2018 results must be publicly available at the time of publication or within 60 days thereafter. The system must be purchasable as a complete platform from an Original Equipment Manufacturer within 60 days of publication. Alternatively, licensees may report results for systems which may not be available from an OEM but whose individual components are publicly available and purchasable from various vendors at the time of publication or within 60 days thereafter. Note that the 60-day grace period does not apply to system software. All software used must be publicly available and be of release-quality available from the original software vendor.

## **Software**

OEM software used to generate official MobileMark 2018 results has no grace period, and therefore must be release quality and publicly available from the original vendor immediately upon publication of results.

## **Performance or Battery Life Enhancements**

Use of performance or battery life enhancements such as using a software utility or other technique is allowed under the following conditions. Any performance or battery life enhancing software must be a release-quality, publicly available offering from the original vendor(s). Any performance or battery life enhancing techniques must be accessible to the public at large. Use of either method must be documented and included with the FDR submission. Performance or battery life enhancing techniques must not compromise the integrity of the system under test or the MobileMark 2018 software. The use of drivers or other software specifically optimized for the purpose of increasing MobileMark 2018 battery life or performance qualification scores is expressly prohibited. BAPCo shall reserve the right to review the usage of such tools or techniques and invalidate submitted results at its sole discretion.

## **Wireless Connectivity**

MobileMark 2018 requires that the system's wireless network adapter be turned on and associated with a wireless network which is not connected to the Internet for the duration of the test.

## **Screen Brightness**

The test system display brightness must be set to a value not less than 200 nits, as measured on DC (battery) power in the center of an all-white screen. Screen dimming or use of ambient light sensing technology to control screen brightness during the test is not allowed. The screen brightness setting must

be maintained for the duration of the test, except when screen off or Modern Standby is in use (see below).

In cases where the system display is not capable of reaching 200 nits brightness on DC (battery) power as measured in the center of an all-white screen, the screen brightness must be set to the maximum brightness value as measured on DC (battery) power for the duration of the test, except during periods of screen off and/or Modern Standby. System displays not capable of reaching 200 nits brightness on DC (battery) power must be documented as part of any FDR submission.

### **Screen Off**

Use of operating system supported screen off capability is allowed provided that:

- Screen off timeout value must be set to a minimum of 5 minutes on DC power.
- Screen off only occurs during idle periods of the benchmark, only after the point in each idle period where 5 minutes of idle has elapsed.

### **Modern Standby**

Use of operating system supported Modern Standby is allowed at the tester's discretion provided that:

- Screen off timeout value must be set to a minimum of 5 minutes on DC power
- Modern standby only occurs during idle periods of the benchmark, only after the point in each idle period where 5 minutes of idle has elapsed.
- The test system meets the requirements of the Microsoft Modern Standby specification: <https://docs.microsoft.com/en-us/windows-hardware/design/device-experiences/modern-standby>
- Standby/Hibernate: Use of operating system supported standby/hibernate capability is NOT allowed, with the exception of Modern Standby when used in accordance with the rules above.

### **Windows 10 Performance/Power Slider and Battery Saver Mode**

The Windows 10 Performance/Power slider may be used to configure the system under test, provided that the slider position remains the same for the duration of the test. For slider positions "Better Battery", "Better Performance" and "Best Performance", the Battery Saver threshold must not exceed 20%, and the setting "Lower screen brightness while in battery saver" must be unchecked. When using the "Best Battery" position for slider testing, the Battery Saver threshold must be set to 100% so that battery saver remains in effect throughout the test. The setting for "Lower screen brightness while in battery saver" must be unchecked. Refer to the MobileMark 2018 user guide 'Windows 10 Performance/Power slider' section for details on how to configure the slider for "Best Battery".

## Full Disclosure Report

A complete Full Disclosure Report (FDR), must be generated by the Workload Manager for all published results. This FDR must include the MobileMark 2018 battery life rating and the performance qualification, as well as the performance scores for each of the three scenarios. Additional information about the configuration of the system under test must also be included in the FDR. The format and the information included in this report is determined by BAPCo. No modifications should be made to the FDR (modifications to the FDR will invalidate the FDR).

## Publication of results

BAPCo requires all licensees to submit FDRs to the BAPCo website (<https://results.bapco.com>) for all publicly available published results. Results may be submitted by any of the following methods:

- 1) Clicking the 'submit results' button from inside the benchmark GUI after a completed run
- 2) Uploading results via the online submission form at <https://results.bapco.com>

Or, if the above options are not available

- 3) Results may be submitted by email to [report@bapco.com](mailto:report@bapco.com)

Licensees are responsible for retaining FDR records for all published results. Results submitted by email will also be published at [results.bapco.com](https://results.bapco.com).

All FDRs submitted by licensees to BAPCo are subject to a 10 working day review period. During this review period any BAPCo member can challenge the submitted FDR or submit a counter FDR. When a challenge occurs or a counter FDR is submitted, BAPCo will decide which, if any, of the FDRs will be accepted for inclusion in the FDR database.

Any publication of results must be accompanied by at least the system model number plus any discrepancies between the shipping configuration of that system model and the configuration of the system model actually tested.

Results collected on systems that do not meet the minimum system requirements for running MobileMark 2018 may be published if submitted to BAPCo for inclusion in the FDR database. However, BAPCo will only offer technical support for system configurations that meet or exceed the minimum system requirements for MobileMark 2018.

Any publication of MobileMark 2018 results must include the MobileMark 2018 Battery Life score and MobileMark 2018 Overall Performance Qualification score from the same run.

Any publication of MobileMark 2018 results must include a link to the online results database where the claim has been submitted.

## Relative Performance

Licensees have the option of publishing the relative performance (and battery life) of two or more systems (for example, “System X is 15% faster than System Y using MobileMark 2018”) as long as the licensee adheres to the Benchmark Execution and Publication rules above for all systems.

If a licensee publishes the relative performance of two or more systems and one or more of those systems does not adhere to the Benchmark Execution and Publication rules above, the licensee must state that the performance results are “estimated” or “projected” when making the claim (for example, “We estimate that System X is 15% faster than System Y using MobileMark 2018”). Publishing absolute scores of estimated or projected results is not permitted.

## Availability

When publishing MobileMark 2018 results, the tested system must be available for purchase by the public either at the time of publication or within 60 days after publication. Note that the 60-day grace period does not apply to system software. All software used must be release-quality and made publicly available from the original software vendor.

## FDR Processing

The submitted FDRs are processed by BAPCo and classified as:

*Released for publication* - The results are released for publication as filed.

*Rejected* - The results are rejected for publication as filed.

The Released for publication classification is in no way a validation or an endorsement of the results by BAPCo. Licensees are free to publish results as long as a complete and valid FDR has been generated and submitted to results.bapco.com. BAPCo will perform frequent audits of the submitted FDRs and reserves the right to revoke the license granted to licensees who have not adhered to the regulations described in this or other MobileMark 2018 documentation. In the case where an FDR is returned to the licensee with rejected classification, the licensee must immediately stop publication of the rejected results until the matter is clarified by BAPCo. Any publication of results must be accompanied by at least the system model number plus any discrepancies between the configuration of the stated model number and the configuration of the system tested. Any publication of MobileMark 2018 results must include the MobileMark 2018 Battery Life score and MobileMark 2018 Overall Performance Qualification score from the same run. The term MobileMark is a registered trademark of the Business Applications Performance Corporation and may only be used in conjunction with performance metrics generated by the MobileMark 2018 Workload Manager. Any other performance characterizations may be made but must be derived from the performance metrics generated by the Workload Manager. The terms

MobileMark and MobileMark 2018 may not be used as the performance metric describing such characterizations.

### **Publication of Results on Non-OEM Platforms**

BAPCo accepts FDR submissions and allows the publication of performance qualified battery life indices when using MobileMark 2018 for making "Non-OEM" platform comparisons. This includes performance-qualified battery life comparisons on systems that are not shipped from an OEM as a complete platform. An example of such comparisons would be swapping to a different hard disk or changing the amount of RAM in the test system and demonstrating the impact on the benchmark results. Results submitted to BAPCo or published on Non-OEM platforms must be marked as Modified on the accompanying FDR submission and whenever appearing in publications of any kind. Any publication of MobileMark 2018 results must include the MobileMark 2018 Battery Life score and MobileMark 2018 Overall Performance Qualification score from the same run.