



BAPCo® MobileMark® 2018 User Guide

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Introduction

MobileMark[®] 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[®] or Intel[®] dual-core processor
- **RAM:** 4 GB
- **HDD/SSD:** 25GB of free space on the primary drive
- **Operating System:** Microsoft[®] Windows[®] 10 64-bit
- **Resolution:** 1280x800 or 1366x768
- **Graphics:** DirectX 10 compatible

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 MS 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 following command and pressing 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[®] 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 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 installation

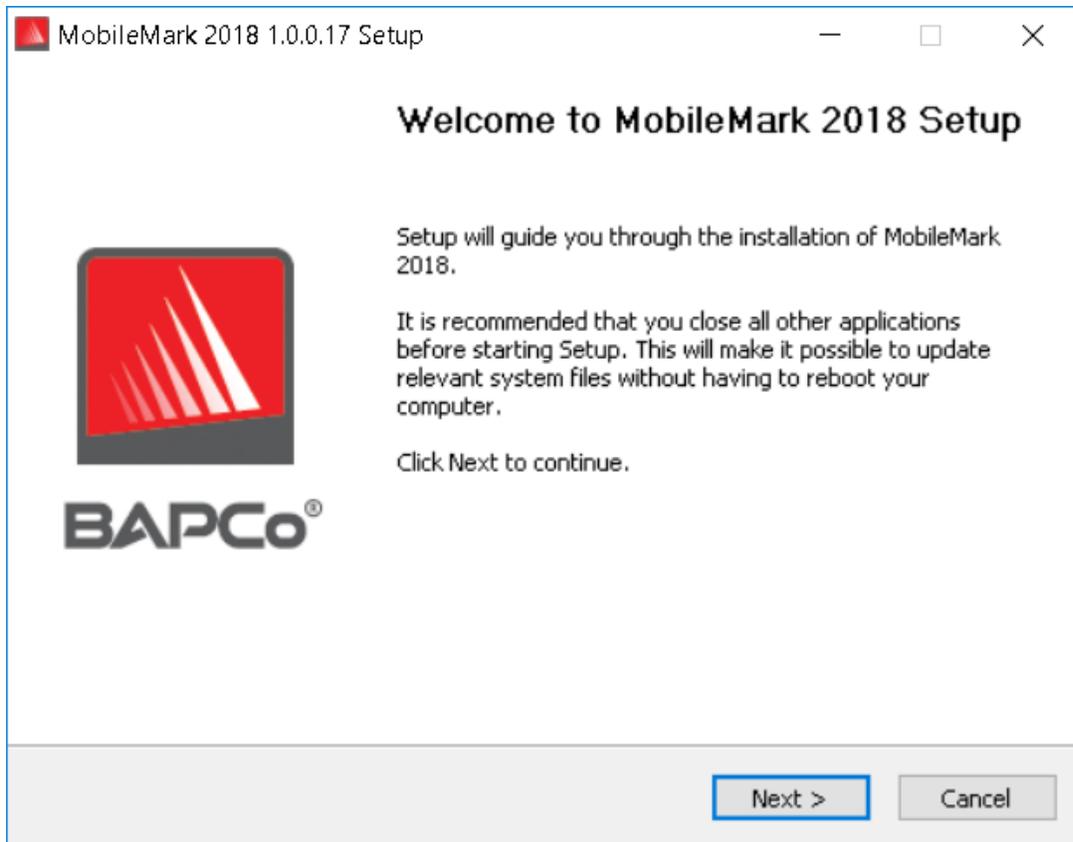


Figure 1: MobileMark 2018 installer window

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

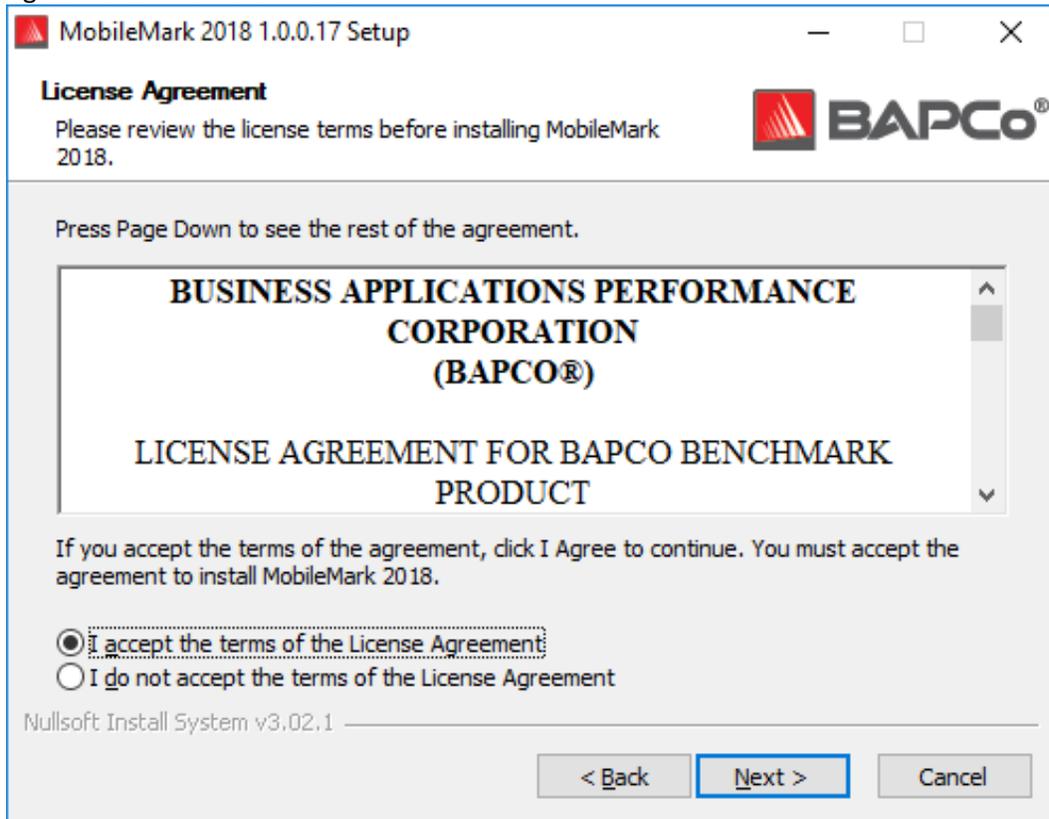


Figure 2: MobileMark 2018 EULA

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

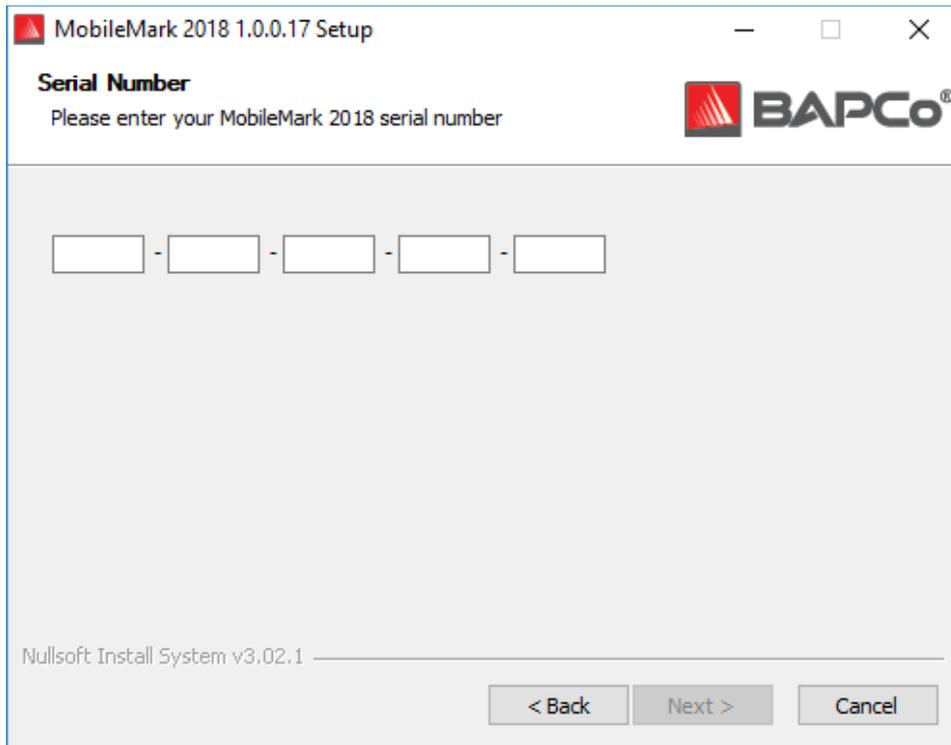


Figure 3 Enter a valid MobileMark 2018 serial number to proceed with installation.

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'

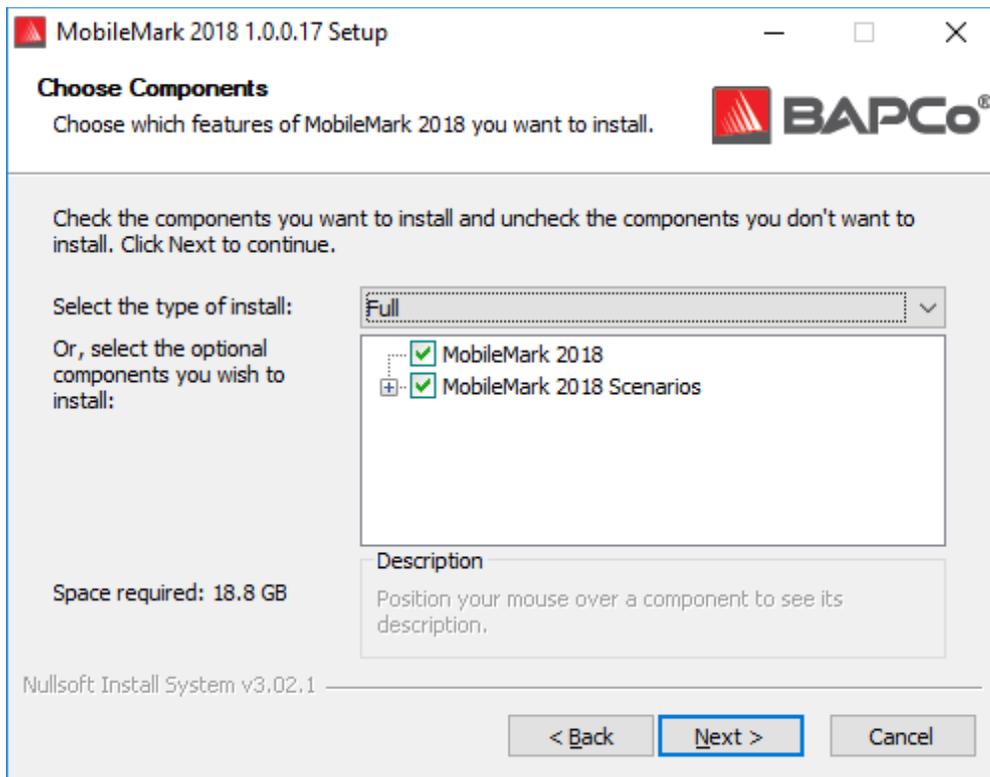


Figure 4: Default full install of MobileMark 2018

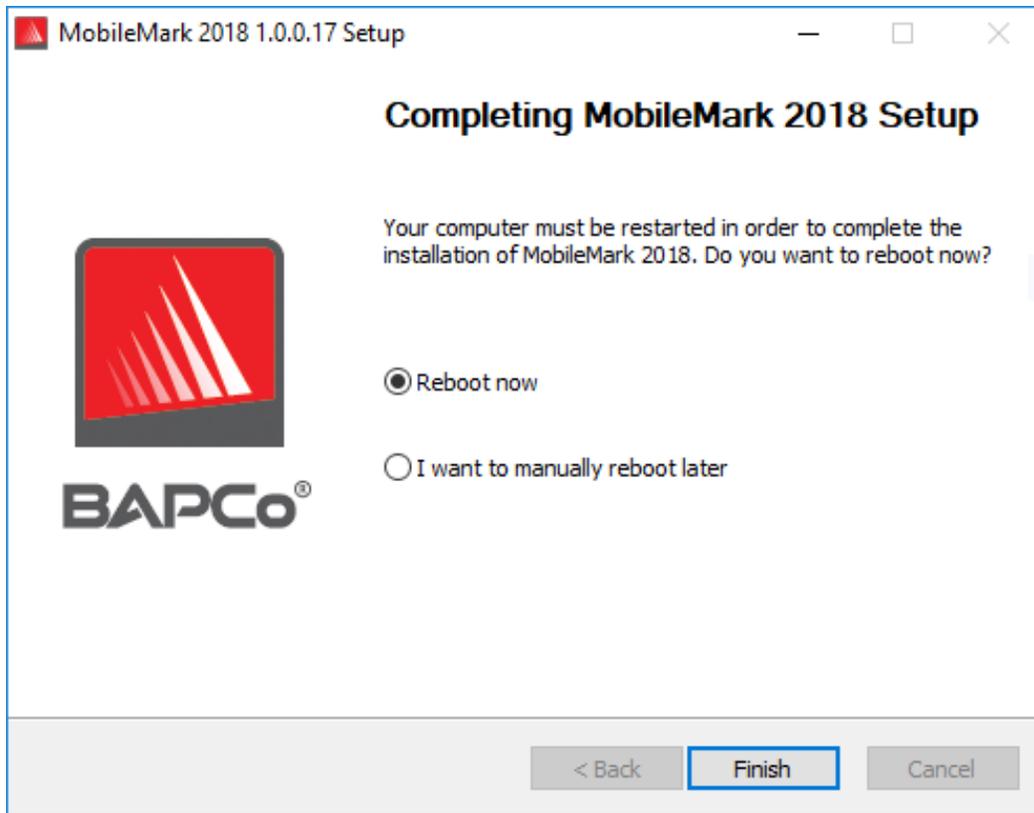


Figure 5: Installation of MobileMark 2018 has completed successfully

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® 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.

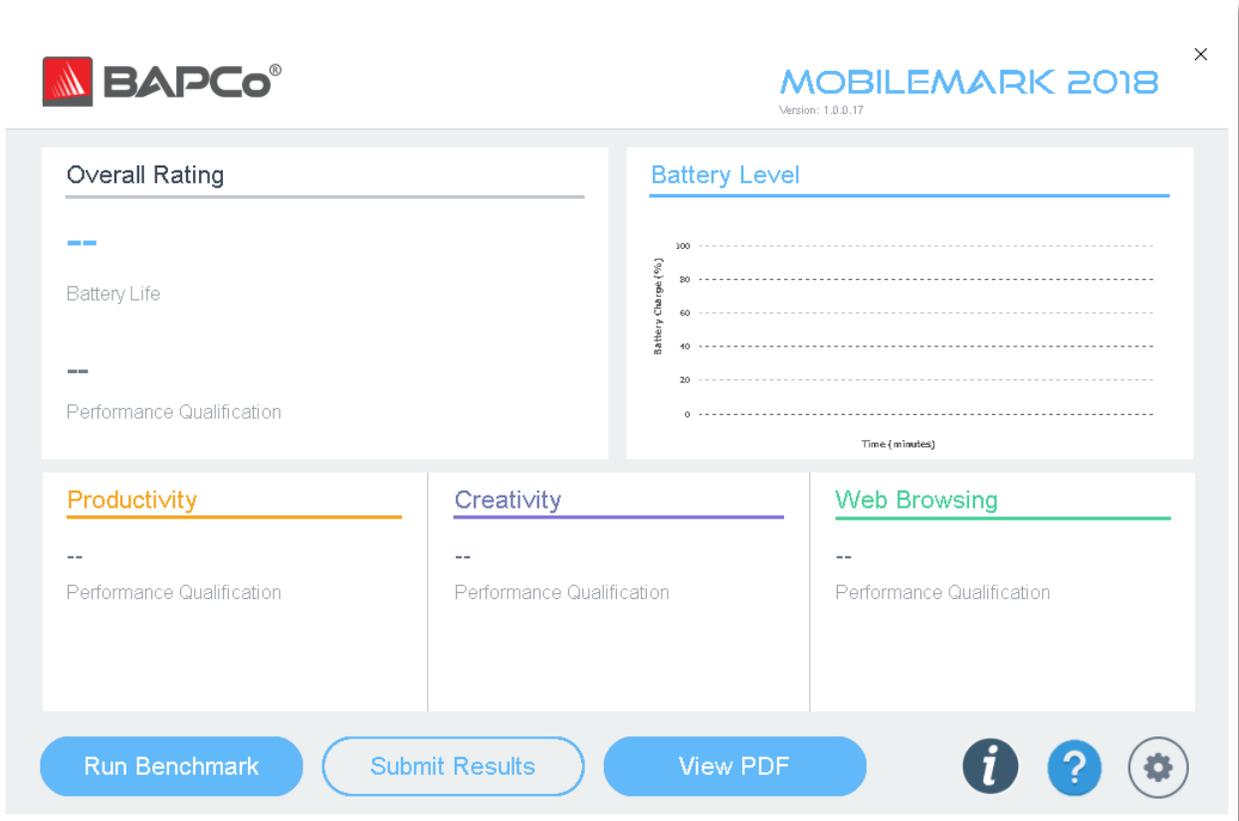


Figure 6: MobileMark 2018 interface.

MobileMark[®] 2018 interface

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

- Run one iteration of all three scenarios.
 - The project name will '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

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

BAPCo encourages users to submit the PDF of valid results from MobileMark[®] 2018 for publication at results.bapco.com. A result valid for submission will include scores for all three scenarios, plus an overall rating. 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. To upload results by drag and drop do the following steps:

- Locate the PDF files to be submitted
- Navigate to 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 publically 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 <serialnumber>, 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 SYSTEM CONFIGURATION FROM COMMAND LINE 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 errors.

Benchmark settings

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

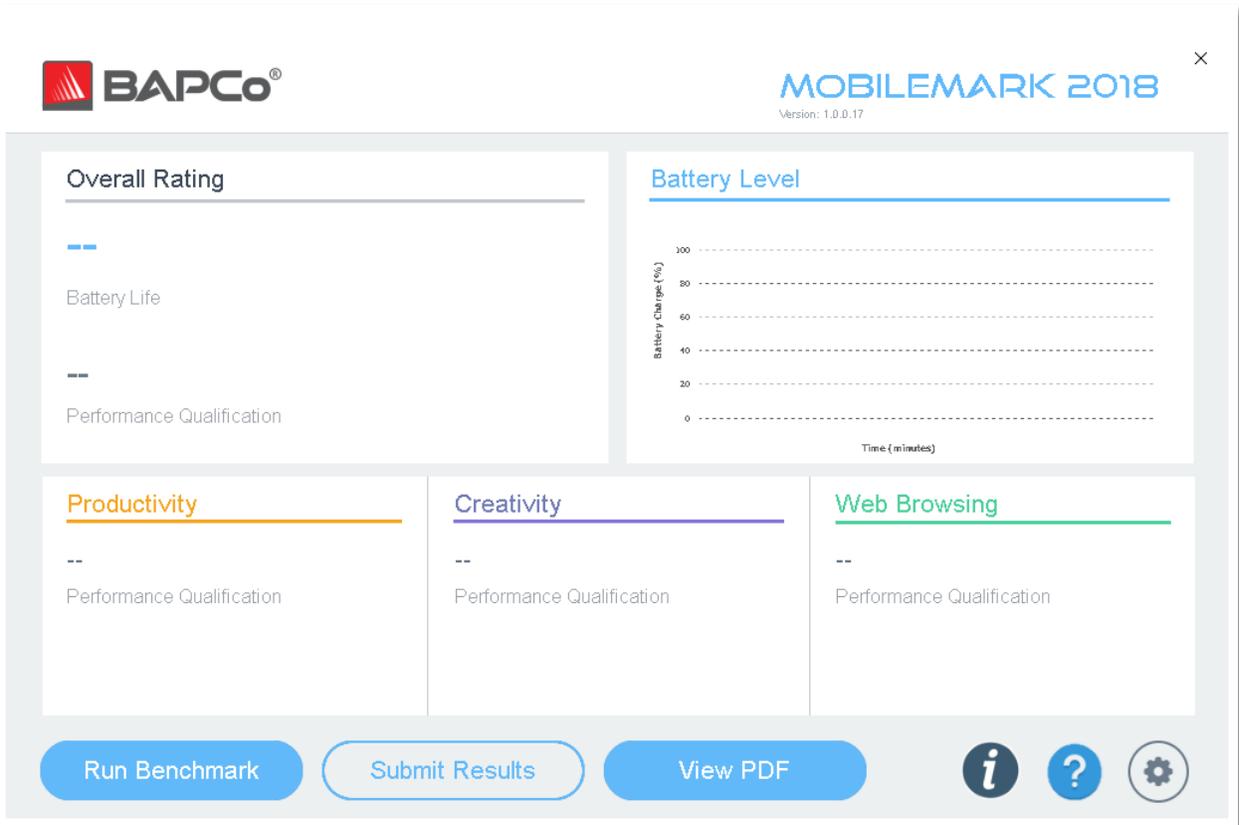


Figure 7: MobileMark 2018 settings button

Clicking '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.

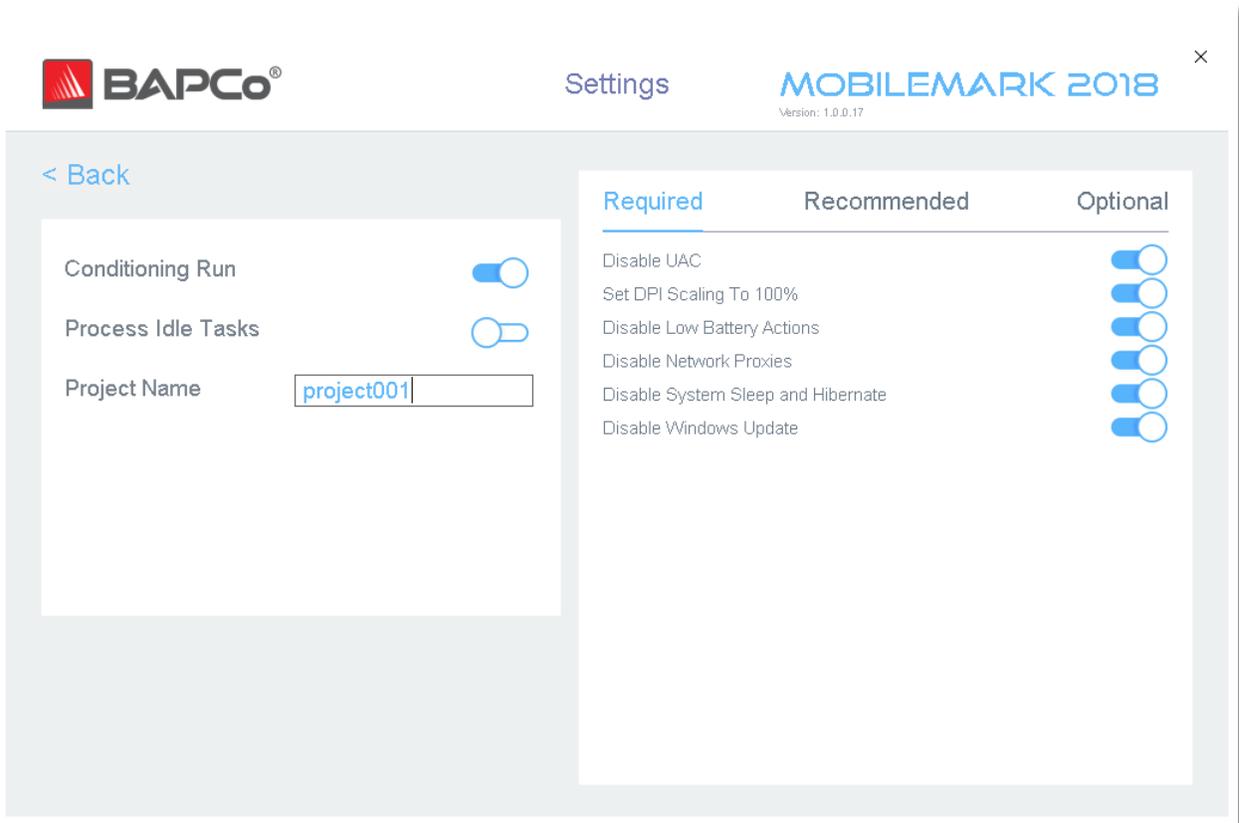


Figure 8: MobileMark 2018 configuration options on Windows 10

System Configuration Tool

The configuration tool runs automatically at the start of each test, and records the state 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 require, 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.

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 High Performance

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

```
"C:\Program Files (x86)\BAPCo\MobileMark2018\bin\MobileMark 2018.exe" -p test_project -sc=HighPerformance= 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 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. Win 7 only

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

Disable Windows Sidebar/Gadgets

Turns off Gadgets. Win 7 only

```
"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. Win 7 only

```
"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. Disables Firewall on Windows 7.

```
"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=WindowsUpdate= Off"
```

The above command will execute the benchmark in a project called 'test_project', run the defaults of one iteration plus the conditioning run. The WindowsUpdate option in the configuration tool will be set to 'Off' meaning the Windows Update service will not be disabled during the test.

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

In a future update, BAPCo will add the option `-sc=" all=On|Off"`, which will allow the user disable all the system configuration options without having to specify each item on the command line. Configuration items listed as Required cannot be disabled.

Tips For 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'. The default settings are listed below.

- 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 set to 200nits 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 shutdown 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:

- Press the CTRL-ALT-DEL keys at the same time, in order to bring up the Windows change password screen
- Click 'Cancel' to return to the desktop
- Keyboard and mouse input should now be enabled
- Navigate to the systray in the lower right corner of the screen and find the BAPCo icon, as shown below
- 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® ThinkPad™ T480s

- CPU: Intel Core i5-8250U @ 1.60 GHz
- Graphics: Intel HD 620
- Resolution: 1920x1080
- Display Brightness: 200 nits
- OS build version: Win 10 RS4 build 10.0.17134.228 (64bit)
- RAM: 1 X 8GB (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[®] Acrobat[®] Pro DC
- AutoIT 3.3.14.2
- Google Chrome[™]
- Microsoft[®] Excel[®] 2016
- Microsoft[®] OneNote[®] 2016
- Microsoft[®] Outlook[®] 2016
- Microsoft[®] PowerPoint[®] 2016
- Microsoft[®] Word[®] 2016
- Windows Zip

Creativity

- Adobe[®] Photoshop[®] CC 2017
- Adobe[®] Lightroom[®] Classic CC
- CyberLink PowerDirector[®] 2015

Web Browsing

- Google Chrome[™]
- 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), and 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 @ 24fps.

Support

Technical support for MobileMark 2018 is provided on the web at <https://bapco.com/support> and via email at 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[®] 2018 Benchmarking Rules

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 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 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.

Performance Enhancing Utilities: Use of performance enhancing utilities or techniques is allowed provided that the utility or technique is publicly available, release-quality software from the original vendor. The utility needs to be documented and such techniques should not compromise the integrity of the system under test or the benchmark. BAPCo shall reserve the right to review the usage of such tools or techniques and invalidate published results if need be.

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

Ambient Light Sensors Use of adaptive brightness screen dimming technologies is strictly forbidden and must be disabled prior to running the test. Refer to Screen Brightness.

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. The 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 at the tester's option provided that:

- Screen off timeout value must be set to 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 Battery Saver Use of Windows 10 "Battery Saver" is permitted under the condition that it set to activate at no greater than 20% and the check box "Lower Screen brightness while in battery saver" is disabled

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.

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 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 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

BAPCo encourages all licensees to submit FDRs on the BAPCo website (<https://results.bapco.com>) for all publically available results. To submit results, the licensee may submit directly from the tested system by clicking the submit results button, use the online submission form at <https://results.bapco.com>, or, via email to report@bapco.com. If the licensee publishes results external to the BAPCo web site, the licensee agrees to submit the FDR within 5 business days, upon request from BAPCo.

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.

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. The submitting licensees are free to publish results as long as a complete and valid FDR has been generated. The licensee agrees to submit the valid FDR to BAPCo within 5 business days, upon request from BAPCo. 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. The publication can use the single overall MobileMark 2018 rating or the combination of the overall rating and a scenario rating. Licensees may not publish scenario ratings unless the overall MobileMark 2018 rating is also included. (E.g. the Productivity scenario rating cannot be published without disclosing the MobileMark 2018 overall rating) The term SYSmark 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 SYSmark and MobileMark 2018 may not be used as the performance metric describing such characterizations.

Publication of Results on Non-OEM Platforms

BAPCo allows the publication of performance indices using MobileMark 2018 for making "Non-OEM" platform comparisons. This includes performance comparisons on systems that are not shipped from an OEM as a complete platform. An example of such comparisons is when a graphics card manufacturer wishes to compare the performance of its graphics card to that of another manufacturer in an identical platform by swapping the cards and measuring the performance. Results published on Non-OEM platforms must be marked as Modified on the accompanying FDR and whenever appearing in publications of any kind.

Publication of Results for Competitive Comparisons

Licensees may publish results on competitor systems as long as the performance results for the competitor have been published previously at www.bapco.com. In the case where competitor performance results are not available, the competitor will be notified by BAPCo and given fifteen working days to provide a counter-FDR for its own system or challenge the submitted FDRs (results). The submitted results may not be published until the fifteen-day waiting period has expired and all matters with respect

to any counter-FDRs have been resolved by BAPCo. In the absence of a response from the competitor after fifteen days, the original publishing licensee may begin publication. Industry publications may publish results for making competitive comparisons without being subject to the above procedure. Publications are, however, subject to all other regulations set forth in this document.