Mobile Client Capability Brief for Microsoft* Windows* Defender*

http://www.intel.com/performance/resources

Version 2008-7
Rev 0.1

Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit Intel Performance Benchmark Limitations (http://www.intel.com/performance/resources/limits.htm).

Information in this document is provided in connection with Intel products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Intel's Terms and Conditions of Sale for such products, Intel assumes no liability whatsoever, and Intel disclaims any express or implied warranty, relating to sale and/or use of Intel products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Intel products are not intended for use in medical, life saving, or life sustaining applications.

Intel may make changes to specifications and product descriptions at any time, without notice.

Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them.

Intel® Solid State Drives may contain design defects or errors known as errata. Current characterized errata are available on request.

Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order.

Copies of documents which have an ordering number and are referenced in this document, or other Intel literature, may be obtained by calling 1-800-548-4725 or by visiting Intel's Website at http://www.intel.com.

* Other names and brands may be claimed as the property of others.

About this Document

This document is a guide measuring performance of the Intel® Solid State Drive on application software. The primary audience for this document includes individuals, publications, OEMs and technical analysts whose goal is to test or evaluate the performance benefits and features of the Intel® Solid State Drive. If there are questions that are not answered here on software application performance evaluation of the Intel® Solid State Drive, please contact your Intel representative.

Each software application test measures different aspects of processor and/or system performance. While no single numerical measurement can completely describe the performance of a complex device like a microprocessor or a personal computer, application tests can be useful tools for comparing different components and systems. The following results and procedures give a glimpse of the performance of certain software applications, however your own usage of each application may vary from what is shown here. The only totally accurate way to measure the performance of your system, is to test the actual software applications you use, in the way you use them, on your computer system. Test results published by Intel are measured on specific systems or components using specific hardware and software configurations, and any differences between those configurations (including software) and your configuration may make those results inapplicable to your component or system.

Software application tests are, at most, only one kind of information that you may use during the purchasing process. To get a true picture of the performance of a component or system you are considering purchasing, you must consult other sources of information (such as performance information on the exact system you are considering purchasing). If you have any questions about the performance of any Intel product, please view the detailed performance briefs and reports published by Intel or call Intel at (US) 1-800-628-8686 or 916-356-3104.

Chapter 1

Performance on Microsoft* Windows* Defender*

1.0 Application Description

Microsoft* Windows* Defender* is software that helps protect computers against pop-ups, slow performance and security threats caused by spyware and other unwanted software by detecting and removing known spyware from users' computers. Windows Defender features real-time protection, a monitoring system that recommends actions against spyware when it's detected, minimizes interruptions and helps users stay productive.

1.1 Workload Description

A user's system performs an automated spyware scan at a pre-appointed time using Microsoft* Windows* Defender 1.1.1600.0 (this version comes with Vista SP1). The tested workload for this scenario is a folder containing 40,761 files totaling approximately 8 GB and composed of files found in the Windows directory.

Chapter 2
Measurement Methodology

The following is a description of the measurement methodology that should be used to evaluate performance and energy efficiency of the mobile platform while running this scenario.

2.0 System Setup

This section outlines the system setup recommended for all benchmarks under Microsoft Windows* Vista Ultimate Edition:

- Always start with a clean, formatted hard disk.
- Set your system to boot from CD/DVD drive in the bios.
- Begin installation Windows* Vista Ultimate Edition* from the operating system CD.
- Format the file system to NTFS during installation if the drive if you have not already done so.
- After installation of the OS is complete restart your system.
- Immediately after installing the Windows Vista operating system, install the latest drivers (INF files) to allow the operating system to recognize the chipset and all the components on the motherboard. The drivers can be downloaded from the chipset software link at http://downloadfinder.intel.com
- Install the latest Intel Matrix Storage Manager. The install file can be downloaded from the chipset software link at http://downloadfinder.intel.com. (Windows Vista installs the basic driver for Intel Matrix Storage, and you should update the driver once the OS boots up.) The Intel® Matrix Storage Driver can provide better system performance because features like Native Command. Some system benchmarks with an I/O component, like BAPCo* SYSmark*, may show increased performance with the Intel Matrix Storage Driver installed and the system set to raid-ready.
- Install the Intel integrated sound driver from http://support.intel.com or from your motherboard CD.
- Install the latest LAN driver from http://support.intel.com.
- Download and Install the latest Windows Vista graphics driver for your graphics card from the manufacturer website.
- The table below describes how to perform an initial setup of Windows Vista.

Microsoft Windows* Vista Setup	Setting	Description of how to set up Windows Vista
Windows Aero	Enable	Ensure Windows Aero is enabled - Right click on desktop -> Personalize -> Window color and appearance -> click on "Open classic appearance properties for more color options - Ensure "Windows Aero" is checked. Note: In order for Aero to work on Intel Graphics Media Accelerator X3000 and 3000, Vista drivers should be installed prior to setup Aero feature in Vista.
Search Indexing	Enable	Leave Search Indexing Enabled - You can check if Search Indexing is enabled by Open Control Panel -> System and Maintenance -> Indexing Options. The Indexing location will include: Offline Files, Start Menu, and Users.
Internet Offline Files	Enable	Leave Internet Offline files Enabled - You can check if Offline files is enabled, Open Control Panel -> Network and Internet -> Offline Files. On the general tab, the "Disable Offline Files" button should appear.
Disable Screen saver	Disable	Right click on desktop -> Personalize -> Screen Saver. Set the screen saver to "None"
Disable Power Management	High Performance	Right click on desktop -> Personalize -> Screen Saver -> Change Power settings -> Select "High Performance" and click "Change plan settings" below this option. A new view will appear called "Edit Plan Settings." Change "Turn off display" to "Never." Click Save Change. (Note: Exceptions include MobileMark* and other standardized benchmarks that measure battery life; these should be run with their own power management settings.)
Vista Desktop Display resolution, monitor refresh	Custom	Right click on desktop -> Personalize -> Display Settings. In the "Display Settings" dialog choose Resolution=1024x768 and Colors= Highest (32bit). Click the "Advanced Settings" button. Select the "Monitor" tab and change the "Screen refresh rate" to 75 Hz.
Remove always on top	Disable	Right click on Windows task bar at the bottom -> Properties -> Taskbar -> uncheck "Keep the taskbar on top of other windows"
Remove hide inactive icons	Disable	Right click on Windows task bar at the bottom -> Properties -> Select the "Notification area" tab and uncheck "Hide inactive icons"

Disable Windows "Welcome screen"	Disable	Open Control Panel -> System and Maintenance -> Welcome Center, Uncheck "Run at Startup" at the bottom of the Windows Welcome screen
Disable System Protection (previously "System Restore")	Disable	Open Control Panel -> System and Maintenance -> System. Under the tasks link on the left side select System Protection. Uncheck "Local Disk" found in the "Automatic restore points" section.
Disable Security Center Alerts	Disable	Open Control Panel -> Security Center. On the left side at the bottom click on the link, "Change the way Security Center alerts me." In the dialog select "Don't notify me and don't display the icon (not recommended)"
Adjust Folder Options for hidden files	Custom	Open Control Panel -> Appearance and Personalization -> Folder Options. On the view tab select "Show hidden files and folder" uncheck "Hide extensions for known file types" and uncheck "Hide protected operating system files (Recommended)"
Disable backup on Recycle bin	Disable	Right click on the recycle bin and choose properties. On the general tab select "Do not move files to the Recycle Bin. Remove files immediately when deleted"
Disable Windows Sidebar	Disable	Remove "Windows Sidebar" by right click on the Windows sidebar, click properties, Uncheck "Start Sidebar when windows Starts"
Disable Disk Defragmentation	Disable	Click on "My Computer", right click on the C: drive. Click "Properties", "Tools", "Defragment Now". Uncheck "Run on Schedule"
Disable User Account Control	Disable	Open Control Panel -> User Accounts and Family Safety -> User Accounts -> Turn User Account Control on or off -> Continue -> Uncheck Use User Account Control (UAC) to help protect your computer -> OK -> Restart Computer

2.1 Evaluation of Platform Performance

This section outlines the recommended methodology for evaluating platform performance.

Clean up Windows prefetch

1. Delete the contents of the c:\windows\prefetch directory between testing of **individual** benchmarks.

Allow your system to settle into an idle state:

1. Reboot your computer.

2. Open the Task Manager by right clicking on the Taskbar and clicking the option for Task Manager. Click on the Performance tab in the Task Manager.

3. Click on the Resource Monitor button in the Task Manager. This will bring up the Resource Monitor Window below.

4. Click on the panel that says Disk. This will allow you to view the various active requests to the disk drive.

5. Watch the Resource Monitor. The number of requests to the disk will gradually decline. Wait until there are no more requests to the disk as shown below.

6. After there are no more requests to disk, close the Resource Monitor.

Process Idle Tasks

1. Call the ProcessIdleTasks API from advapi32.dll using the command line or create and execute a batch file with the following command: ***rundll32.exe advapi32.dll,ProcessIdleTasks***

Training Runs:

1. Run the workload at least 5 times in a row.

2. Process Idle tasks between each training run.

3. Do not reboot between training runs.

Benchmark Run:

1. After you have run the ProcessIdleTasks API, run the workload 5 times in a row without reboots in between each run.
2. Take the median of the 5 runs.

2.2 Evaluation of Mobile Platform Energy Efficiency

This section outlines the recommended methodology for evaluating platform energy efficiency.

2.2.1 Procedure for Measuring Energy Efficiency

When measuring energy consumption of a system running a given benchmark, the power consumption of the total platform should be measured by an external watt-meter or power analyzer. One common tool used to measure power is the Extech 380803 Power Analyzer Datalogger. The Extech 380803 unit allows the measurement of both AC and DC power measurement and includes software to log the power consumption of the test system on another computer system.

- When measuring the DC power consumption of a system, you will need to isolate the positive and negative power lines running between the notebook power adapter and the system. From the power adapter, attach the power lines to the appropriate red and black power terminals of the "Input Voltage" on the Extech unit. Then attach the power lines from the notebook plug to the red and black power terminals of the "Output Load" of the Extech unit. Using the Datalogger software, record the power consumption of the system for the duration of the benchmark using 1.0 second sampling intervals. From the resulting power log, you can derive the average DC power consumption (in Watts) of the system while executing the benchmark.

- When measuring the AC power consumption of a system, plug a power cord into the "Input Voltage" on the Extech unit and into an electrical socket. Then plug in the system's AC power adapter into the "Output Load" of the Extech unit. Using the Datalogger software, record the power consumption of the system for the duration of the benchmark using 1.0 second sampling intervals. From the resulting power log, you can derive the average AC power consumption (in Watts) of the system while executing the benchmark.

Power measurement should begin when the timed portion of the workload begins and should stop when the timed portion of the workload ends. If using the provided script for the scenario then you will be prompted by the script when to start and stop power measurement.

2.2.2 Calculating Workload Energy Consumption in Watt-Hours

Analysis of power consumption results should be performed using the following methodology:

- Calculate the Workload Energy Consumption (WEC) in Watt-seconds by multiplying the average total AC or DC power usage (P_{total}) times the time taken to complete the workload ($t_{workload}$).

  $$WEC\ (Watt\text{-}seconds) = P_{total} \times t_{workload}$$

- Convert the WEC measurement into Watt-hours (Wh) by dividing the WEC in Watt-seconds by 3600 (the number of seconds in an hour).

  $$WEC\ (Wh) = WEC\ (Watt\text{-}seconds) \div 3600$$

The resulting quotient in Watt-hours is the amount of energy consumed by the system in completion of the workload.

Chapter 3
Procedure for Evaluating Performance

The following is a procedure for evaluating performance using Microsoft Windows Defender 1.1.1600.0. Run this test on a system running Windows* Vista with Service Pack 1.

Setting up Microsoft Windows Defender 1.1.1600.0

1. Windows Defender comes preinstalled as a feature in the Windows Vista operating system. Be sure to have Windows Vista Service Pack 1 installed to be sure that the correct version is installed. (Service Pack 1 can be downloaded at

   http://www.microsoft.com/downloads/details.aspx?FamilyID=b0c7136d-5ebb-413b-89c9-cb3d06d12674&DisplayLang=en)

   Do not perform any online updates with the test system.

2. Copy your workload directory to the hard disk.

Running Microsoft Windows Defender 1.1.1600.0

1. Reboot your system.

2. Launch Windows Defender by clicking on the Start Menu, clicking on "All Programs" and selecting "Windows Defender".

3. At the top of the Defender window, click on the arrow to the right of "Scan" and then select "Custom Scan…."

4. Under "Select scan options", select "Scan selected drives and folders"

5. Click on the "Select…" button.

6. Navigate to and check the checkbox beside your workload directory. Click on OK.

7. Click on "Scan Now" to begin the Windows Defender scan.

8. When the scan completes, Windows Defender will display Scan statistics. One of those statistics will be the "Time Elapsed". This is your **task completion time**.

9. Close Windows Defender.

10. Repeat steps 2-9 four more times and record the runtimes as your data. The median value of the five runs is the **median runtime** for this scenario.