PASSMARK® SOFTWARE

Norton Internet Security vs Windows Defender on Windows 8 (Edition 1)

Antivirus & Internet Security
Windows 8

July 2012

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Revision History

Rev	Revision History	Date
Edition 1	Initial version of this report.	9 July 2012

References

Ref #	Document	Author	Date
1	**What Really Slows Windows Down** (URL)	O. Warner, The PC Spy	2001-2012

Executive Summary

PassMark Software® conducted objective performance testing on Norton Internet Security and on Windows Defender. This report presents our results and findings as a result of performance benchmark testing conducted on these two products.

For more details on which versions were tested, please see the section *"Products and Versions"*.

Testing included ten (10) performance metrics. These performance metrics are as follows:

- Boot Time;
- Scan Time;
- File Copy, Move and Delete;
- PE Scan Time;
- Installation of Third Party Applications;
- File Format Conversion;
- File Compression and Decompression;
- Boot Time on SSD;
- Scan Time on SSD; and
- File, Copy, Move and Delete on SSD.

Products and Versions

The names and versions of the two security products tested are as follows:

Manufacturer	Product Name	Release Year	Product Version	Date Tested
Symantec Corporation	Norton Internet Security 2013	2012	20.0.0.133	Jun 2012
Microsoft Corporation	Windows Defender	2012	4.0.8400.0 (This version comes installed with Windows 8 Release Preview build 8400)	Jun 2012

Performance Metrics Summary

The metrics described below test the impact of the security software on common tasks that end-users would perform on a daily basis.

All of PassMark Software's test methods can be replicated by third parties using the same environment to obtain similar benchmark results. Detailed descriptions of the methodologies used in our tests are available as "*Appendix 2 – Methodology Description*" of this report.

Note that Benchmarks 1-7 were conducted using a HDD as the main boot drive, and Benchmarks 8-10 were conducted using a SSD as the main boot drive.

Benchmark 1 – Boot Time

This metric measures the amount of time taken for the machine to boot into the operating system. Security software is generally launched at Windows startup, adding an additional amount of time and delaying the startup of the operating system. Shorter boot times indicate that the application has had less impact on the normal operation of the machine.

Benchmark 2 – Scan Time

All antivirus solutions have functionality designed to detect viruses and various other forms of malware by scanning files on the system. This metric measured the amount of time required to scan a set of clean files. Our sample file set comprised a total file size of 982 MB and was made up of files that would typically be found on end-user machines, such as media files, system files and Microsoft Office documents.

Benchmark 3 – File Copy, Move and Delete

This metric measures the amount of time taken to move, copy and delete a sample set of files. The sample file set contains several types of file formats that a Windows user would encounter in daily use. These formats include documents (e.g. Microsoft Office documents, Adobe PDF, Zip files, etc), media formats (e.g. images, movies and music) and system files (e.g. executables, libraries, etc).

Benchmark 4 – Installing Third Party Applications

This metric measures the amount of time taken to install and uninstall third party programs. The installation speed of third party applications may be impacted by antivirus behavior such as heuristics or real time malware scanning.

Benchmark 5 – File Format Conversion

This test measures the amount of time taken to convert an MP3 file to a WAV and subsequently, convert the same MP3 file to a WMA format.

Benchmark 6 – File Compression and Decompression

This metric measures the amount of time taken to compress and decompress different types of files. Files formats used in this test included documents, movies and images.

Benchmark 7 – File Write, Open and Close

This benchmark was derived from Oli Warner's File I/O test at http://www.thepcspy.com (please see *Reference #1: What Really Slows Windows Down*). This metric measures the amount of time taken to write a file, then open and close that file.

Benchmark 8 – Boot Time on SSD

This benchmark is equivalent to Benchmark 1 except it is carried out on the SSD configuration.

Benchmark 9 – Scan Time on SSD

This benchmark is equivalent to Benchmark 2 except it is carried out on the SSD configuration.

Benchmark 10 – File Copy, Move and Delete on SSD

This benchmark is equivalent to Benchmark 3 except it is carried out on the SSD configuration.

Test Results

In the following comparison charts, we have highlighted the results we obtained for Norton Internet Security in yellow. For all benchmarks, the lower the time taken to complete the test, the better the product has performed in that category. Note that Benchmarks 1-7 were conducted using a HDD as the main boot drive, and Benchmarks 8-10 were conducted using a SSD as the main boot drive.

Benchmark 1 – Boot Time

The following chart compares the average time taken for the system to boot (from a sample of five boots), between Norton Internet Security and Windows Defender.
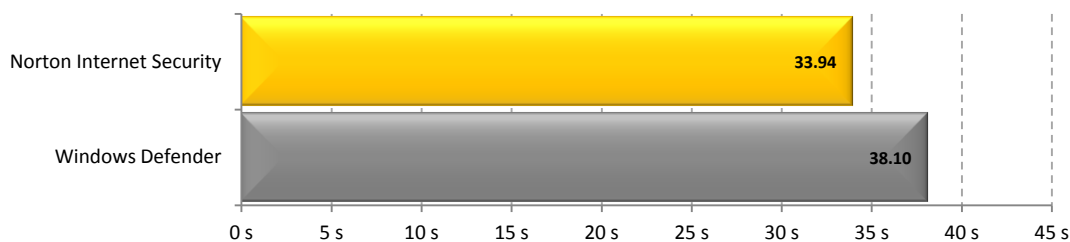
Benchmark 2 – Scan Time

The following chart compares the average time taken to scan a set of 6159 files (totaling 982 MB), between Norton Internet Security and Windows Defender. This time is calculated by averaging the initial (Run 1) and subsequent (Runs 2-5) scan times.
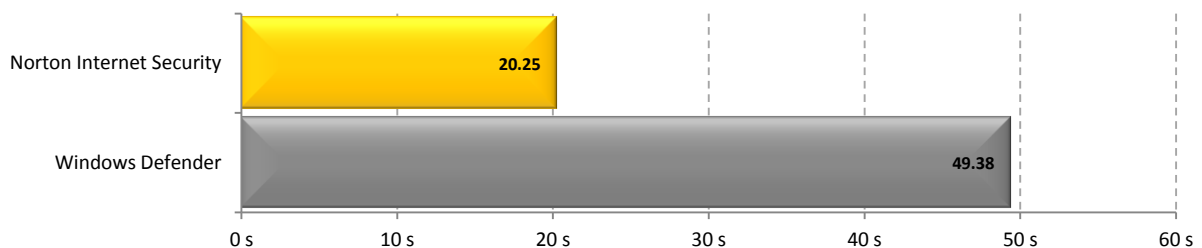
Benchmark 3 – File Copy, Move and Delete

The following chart compares the average time taken to copy, move and delete several sets of sample files, between Norton Internet Security and Windows Defender.
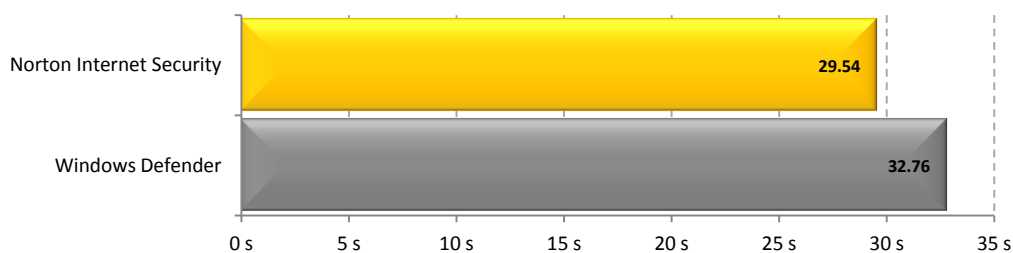
Benchmark 4 – Installation of Third Party Applications

The following chart compares the average time taken to install 3 different third party applications, between Norton Internet Security and Windows Defender.
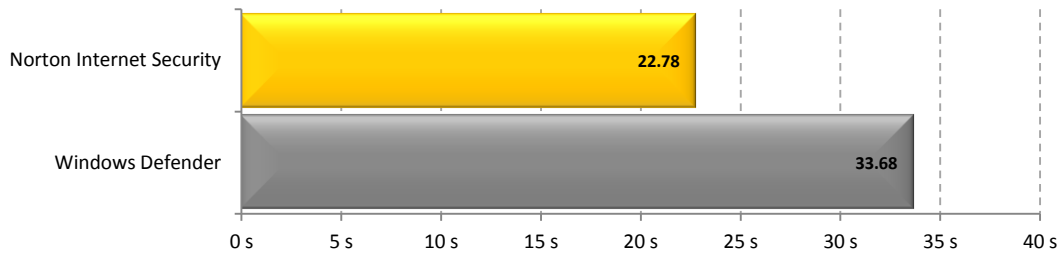
Benchmark 5 – File Format Conversion

The following chart compares the average time it takes for five sample files to be converted from one file format to another (MP3 ↔ WMA, MP3 ↔ WAV), between Norton Internet Security and Windows Defender.

Benchmark 6 – File Compression and Decompression

The following chart compares the average time it takes for sample files to be compressed and decompressed, between Norton Internet Security and Windows Defender.
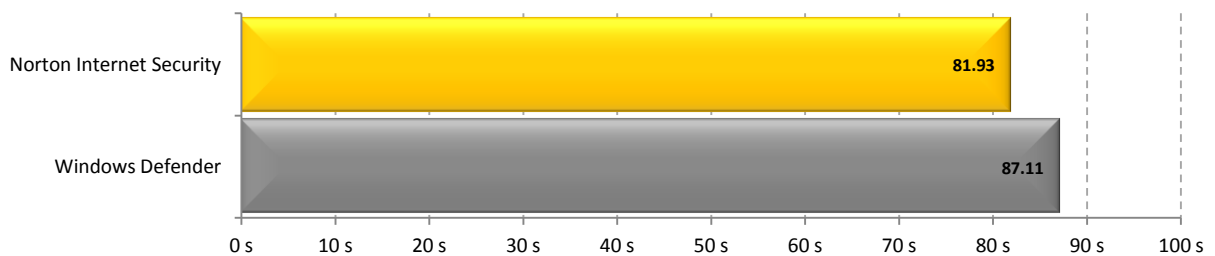
Benchmark 7 – File Write, Open and Close

The following chart compares the average time it takes for a file to be written to the hard drive, and then opened and closed 180,000 times, between Norton Internet Security and Windows Defender.
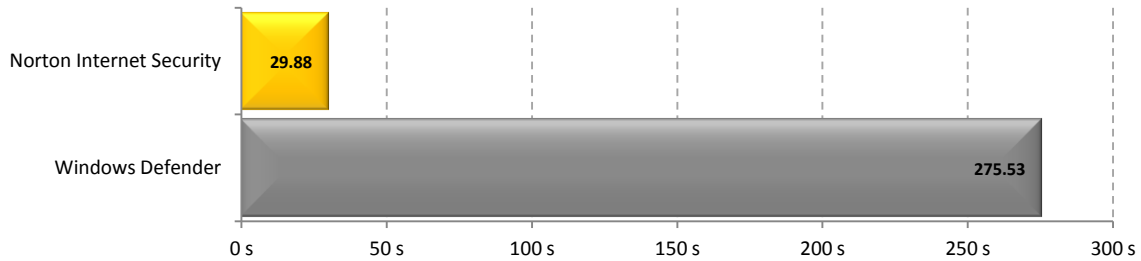
Norton Internet Security **29.88**
Windows Defender **275.53**

0 s   50 s   100 s   150 s   200 s   250 s   300 s

Benchmark 8 – Boot Time on SSD

The following chart compares the average time taken for the system to boot (from a sample of five boots), between Norton Internet Security and Windows Defender, using a Solid State Drive as the main boot drive.

Norton Internet Security **13.43**
Windows Defender **13.55**

0 s   2 s   4 s   6 s   8 s   10 s   12 s   14 s   16 s
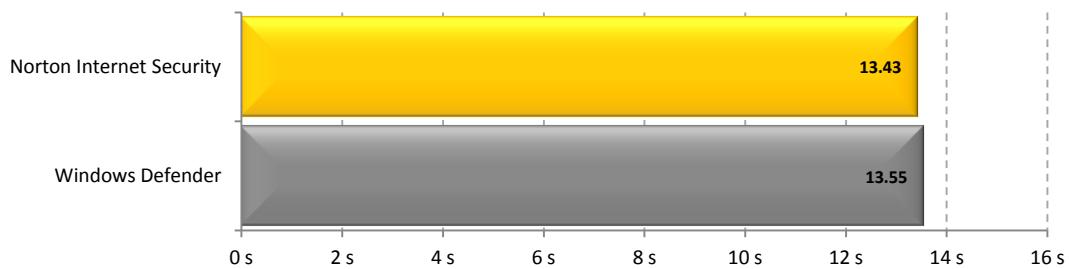
Benchmark 9 – Scan Time on SSD

The following chart compares the average time taken to scan a set of 6159 files (totaling 982 MB), between Norton Internet Security and Windows Defender, using a Solid State Drive as the main boot drive. This time is calculated by averaging the initial (Run 1) and subsequent (Runs 2-5) scan times.

Norton Internet Security **9.25**
Windows Defender **32.13**

0 s   5 s   10 s   15 s   20 s   25 s   30 s   35 s
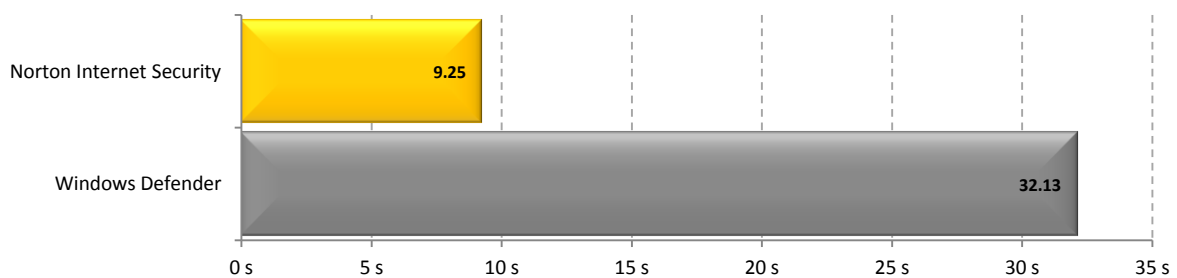
## Benchmark 10 – File Copy, Move and Delete on SSD

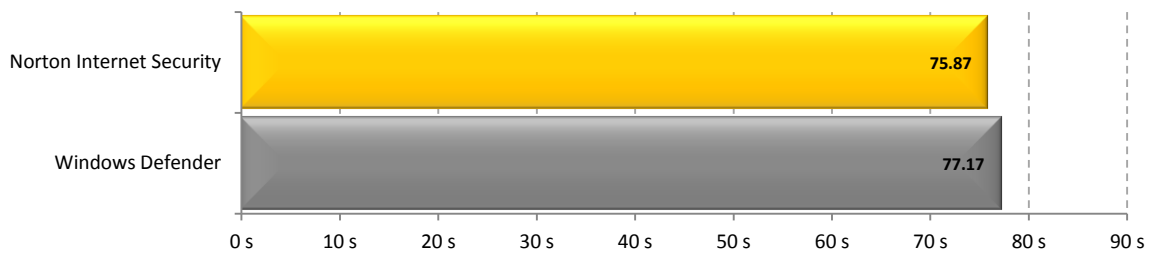The following chart compares the average time taken to copy, move and delete several sets of sample files, between Norton Internet Security and Windows Defender, using a Solid State Drive as the main boot drive.

Disclaimer and Disclosure
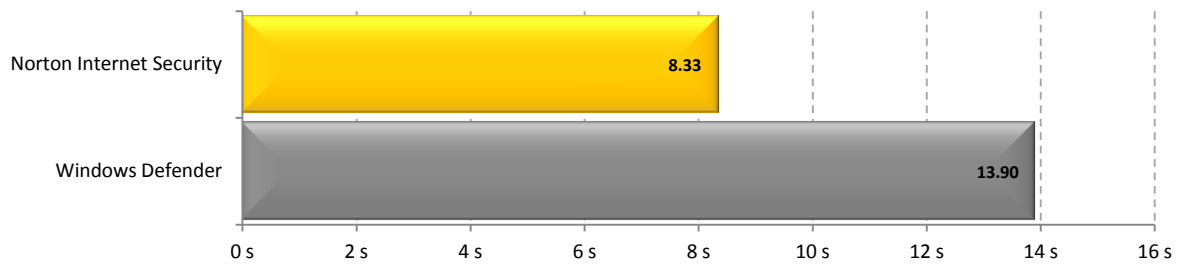
This report only covers the versions that are listed in the "Products and Versions" section of this report.

Disclaimer of Liability

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Disclosure

Symantec Corporation funded the production of this report, selected the test metrics and list of products to include in this report, and supplied some of the test scripts used for the tests.

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Download Location

An electronic copy of this report can be found at the following location:

http://www.passmark.com/win8-avreport

Appendix 1 – Test Environment

For our testing, PassMark Software used a test environment running Windows 8 Release Preview build 8400 (64-bit) with the following hardware specifications:

Windows 8 (64-bit) System

CPU:	Intel Core i7 920 Quad Core @ 2.67GHz
Video Card:	nVidia GeForce 8800 GT
Motherboard:	Intel x58 Motherboard
RAM:	6GB DDR3 RAM
HDD (main boot drive):	Western Digital 500GB 7200RPM
SSD (main boot drive):	Corsair Force Series F115 115GB 2.5" Serial ATA II 3.0Gb/s MLC SSD
Network:	Gigabit (1GB/s) switch

Note: In the above specifications, the HDD (Hard Disk Drive) was used as a main drive for the HDD configuration, whereas the SSD (Solid State Drive) was used as a main drive for the SSD configuration.

Appendix 2 – Methodology Description

Windows 8 Image Creation

As with testing on Windows Vista, **Norton Ghost** was used to create a "clean" baseline image prior to testing. Our aim is to create a baseline image with the smallest possible footprint and reduce the possibility of variation caused by external operating system factors.

The baseline image was restored prior to testing of each different product. This process ensures that we install and test all products on the same, "clean" machine.

The steps taken to create the base Windows 8 image are as follows:

1. Installation and activation of **Windows 7 Ultimate** Edition.
2. Disabled Automatic Updates.
3. Changed User Account Control settings to "Never Notify".
4. Disable Windows Defender automatic scans to avoid unexpected background activity.
5. Disable the Windows firewall to avoid interference with security software.
6. Installed Norton Ghost for imaging purposes.
7. Disabled *Superfetch* to ensure consistent results.
8. Installed *HTTP Watch* for Browse Time testing.
9. Installed *Windows Performance Toolkit x64* for Boot Time testing.
10. Installed Active Perl for interpretation of some test scripts.
11. Install OSForensics for testing (Installation Size and Registry Key Count tests) purposes.
12. Disabled updates, accelerators and compatibility view updates in Internet Explorer 8.
13. Update to Windows Service Pack 1
14. Update to Windows 8 Release Preview Build 8400.
15. Created a baseline image using Norton Ghost.

Benchmark 1 – Boot Time

PassMark Software uses tools available from the **Windows Performance Toolkit** (as part of the Microsoft Windows 7 ADK version 8.59.12616 obtainable from the Microsoft Website).

The boot process is first optimized with **xbootmgr.exe** using the command "*xbootmgr.exe -trace boot – prepSystem*" which prepares the system for the test over six optimization boots. The boot traces obtained from the optimization process are discarded.

After boot optimization, the benchmark is conducted using the command "*xbootmgr.exe -trace boot -numruns 5*". This command boots the system five times in succession, taking detailed boot traces for each boot cycle.

Finally, a post-processing tool was used to parse the boot traces and obtain the *BootTimeViaPostBoot* value. This value reflects the amount of time it takes the system to complete all (and only) boot time processes. Our final result is an average of five boot traces.

Benchmark 2 – Scan Time

Scan Time is the time it took for each product to scan a set of sample files. The sample used was identical in all cases and contained a mixture of system files and Office files. In total there were 6159 files whose combined size was 982 MB. Most of these files come from the Windows system folders. As the file types can influence scanning speed, the breakdown of the main file types, file numbers and total sizes of the files in the sample set is given here:

File Extension	Number of Files	File Size
.dll	2589	490MB
.exe	695	102MB
.sys	332	23MB
.gif	302	1MB
.doc	281	64MB
.wmf	185	2MB
.png	149	2MB
.html	126	1MB
.nls	80	6MB
.jpg	70	1MB
.ini	59	2MB
.ico	58	<1MB
.mof	43	6MB
.ax	39	4MB
.xls	38	3MB
.ime	35	5MB
.drv	31	1MB
.txt	31	1MB
.chm	30	6MB
.cpl	29	4MB
.mfl	29	3MB
.inf	26	2MB
.hlp	22	3MB
.imd	20	18MB
.py	20	<1MB
.msc	18	1MB
.vbs	18	1MB
.xml	18	1MB
.rtf	16	62MB
.ocx	16	4MB
.tsp	14	1MB
.com	14	<1MB
.xsl	14	<1MB
.h	13	<1MB
.vsd	12	2MB
.scr	12	2MB
.aw	12	2MB
.js	12	1MB
.zip	11	25MB
.lex	9	10MB
.ppt	9	4MB
.acm	9	1MB
.wav	7	5MB
Total	6159	982

This scan was run without launching the product's user interface, by right-clicking the test folder and choosing the "Scan Now" option. To record the scan time, we have used product's built-in scan timer or reporting system. Where this was not possible, scan times were taken manually with a stopwatch.

For each product, five samples were taken with the machine rebooted before each sample to clear any caching effects by the operating systems.

In 2009, we noticed many more products showing a substantial difference between the initial scan time (first scan) and subsequent scan times (scans 2 to 5). We believe this behavior is due to products themselves caching recently scanned files.

As a result of this mechanism, we have averaged the four subsequent scan times to obtain an average subsequent scan time. Our final result for this test is an average of the subsequent scan average and the initial scan time.

Benchmarks 3 – File Copy, Move and Delete

This test measures the amount of time required for the system to copy, move and delete samples of files in various file formats. This process was timed using *CommandTimer.exe*.

This sample was made up of 812 files over 760,867,636 bytes and can be categorized as documents [26% of total], media files [54% of total] and PE files (i.e. System Files) [20% of total].

The breakdown of the main file types, file numbers and total sizes of the files in the sample set is shown in the following table:

File format	Number	Size (bytes)
DOC	8	30,450,176
DOCX	4	13,522,409
PPT	3	5,769,216
PPTX	3	4,146,421
XLS	4	2,660,352
XLSX	4	1,426,054
PDF	73	136,298,049
ZIP	4	6,295,987
7Z	1	92,238
JPG	351	31,375,259
GIF	6	148,182
MOV	7	57,360,371
RM	1	5,658,646
AVI	8	78,703,408
WMV	5	46,126,167
MP3	28	191,580,387

EXE	19	2,952,914
DLL	104	29,261,568
AX	1	18,432
CPL	2	2,109,440
CPX	2	4,384
DRV	10	154,864
ICO	1	107,620
MSC	1	41,587
NT	1	1,688
ROM	2	36,611
SCR	2	2,250,240
SYS	1	37,528,093
TLB	3	135,580
TSK	1	1,152
UCE	1	22,984
EXE	19	2,952,914
DLL	104	29,261,568
AX	1	18,432
CPL	2	2,109,440
CPX	2	4,384
DRV	10	154,864
ICO	1	107,620
MSC	1	41,587
NT	1	1,688
ROM	2	36,611
SCR	2	2,250,240
SYS	1	37,528,093
TLB	3	135,580
TSK	1	1,152
UCE	1	22,984
Total	**812**	**760,867,636**

This test was conducted five times to obtain the average time to copy, move and delete the sample files, with the test machine rebooted between each sample to remove potential caching effects.

Benchmark 4 – Third Party Program Installation

This test measured how much time was required to install and uninstall a third party application. For this test, *CommandTimer.exe* timed how long it took to install and uninstall the following applications on the test machine:

- Firefox 3.6.3 (11,909 KB) (MSI File)
- Microsoft .NET 3.5 (34,121 KB) (MSI File)
- Steam (1,551 KB) (MSI File)

This test was conducted five times to obtain the average time to install/uninstall the above third party programs, with the test machine rebooted between each sample to remove potential caching effects.

Benchmark 5 – File Format Conversion (MP3 → WAV, MP3 → WMA)

This test measured how much time was required to convert five (5) different MP3 files into WAV files and subsequently, convert the same MP3 samples into a WMA files. The total size of the five (5) MP3s used was 25,870,899 bytes.

To encode the MP3 into another format, we used an application called *ffmpeg.exe*. The format conversion process was timed using *CommandTimer.exe*.

This test was conducted five times to obtain the average conversion speed between these formats, with the test machine rebooted between each sample to remove potential caching effects.

Benchmark 6 – File Compression and Decompression

This test measured the amount of time required to compress and decompress a sample set of files. For this test, we used a subset of the media and documents files used in the *File Copy, Move and Delete* benchmark. *CommandTimer.exe* recorded the amount of time required for *7zip.exe* to compress the files into a *.zip and subsequently decompress the created *.zip file.

This subset comprised 1,218 files over 783 MB. The breakdown of the file types, file numbers and total sizes of the files in the sample set is shown in the following table:

File Type	File Number	Total Size
.xls	13	9.23 MB
.xlsx	9	3.51 MB
.ppt	9	7.37 MB
.pptx	11	17.4 MB
.doc	17	35.9 MB
.docx	19	24.5 MB
.gif	177	1.10 MB
.jpg	737	66.2 MB
.png	159	48.9 MB
.mov	7	54.7 MB
.rm	1	5.39 MB
.avi	46	459 MB
.wma	11	48.6 MB
.avi	46	459 MB

.wma	11	48.6 MB
Total	**1218**	**783 MB**

This test was conducted five times to obtain the average file compression and decompression speed, with the test machine rebooted between each sample to remove potential caching effects.

Benchmark 7 – File Write, Open and Close

This benchmark was derived from Oli Warner's File I/O test at http://www.thepcspy.com (please see *Reference #1: What Really Slows Windows Down*).

For this test, we developed *OpenClose.exe*, an application that looped writing a small file to disk, then opening and closing that file. *CommandTimer.exe* was used to time how long the process took to complete 180,000 cycles.

This test was conducted five times to obtain the average file writing, opening and closing speed, with the test machine rebooted between each sample to remove potential caching effects.

Benchmark 8 – Boot Time on SSD

This benchmark is equivalent to Benchmark 1 except that it is carried out on the SSD configuration.

Benchmark 9 – Scan Time on SSD

This benchmark is equivalent to Benchmark 2 except that it is carried out on the SSD configuration.

Benchmark 10 – File Write, Open and Close

This benchmark is equivalent to Benchmark 3 except that it is carried out on the SSD configuration.