

Antivirus, Internet Security and Total Security Products Performance Benchmarking (2009)

Vista/Dual Core Hardware

September 2008

Document: Antivirus, Internet Security and Total Security Performance Benchmarking
Authors: Karen Lai, David Wren
Company: PassMark Software Pty Ltd (www.passmark.com)
Date: 08/Sep/08
Edition: Edition 1
File: antivirus_09-performance-testing-ed1.docx

TABLE OF CONTENTS

TABLE OF CONTENTS	2
REVISION HISTORY	5
REFERENCES	5
EXECUTIVE SUMMARY	6
OVERALL RANKING BY PRODUCT CATEGORY	7
INTERNET SECURITY (IS) PRODUCTS.....	7
ANTIVIRUS (AV) PRODUCTS	7
TOTAL SECURITY (TS) PRODUCTS	8
PRODUCTS TESTED	9
INTERNET SECURITY (IS) PRODUCTS.....	9
ANTIVIRUS (AV) PRODUCTS	9
TOTAL SECURITY (TS) PRODUCTS	10
ORIGINAL SET OF METRICS – CRITERIA MEASURED	11
BENCHMARK 1 – BOOT TIME.....	11
BENCHMARK 2 – SCAN SPEED	11
BENCHMARK 3 – USER INTERFACE LAUNCH SPEED	11
BENCHMARK 4 – MEMORY UTILIZATION	11
BENCHMARK 5 – IE LAUNCH SPEED	11
NEW SET OF METRICS – CRITERIA MEASURED	12
BENCHMARK 6 – INSTALLATION TIME	12
BENCHMARK 7 – INSTALLATION SIZE	12
BENCHMARK 8 – REGISTRY KEY COUNT.....	12
BENCHMARK 9 – FILE COPY, MOVE AND DELETE.....	12
BENCHMARK 10 – INSTALLING THIRD PARTY APPLICATIONS	12
BENCHMARK 11 – BINARY FILE DOWNLOAD SPEED	12
BENCHMARK 12 – FILE FORMAT CONVERSION	13
BENCHMARK 13 – FILE COMPRESSION AND DECOMPRESSION.....	13
BENCHMARK 14 – FILE WRITE, OPEN AND CLOSE	13
TEST RESULTS – INTERNET SECURITY (IS) PRODUCTS	14
BENCHMARK 1 – BOOT TIME.....	14
BENCHMARK 2 – SCAN SPEED	14
BENCHMARK 3A – INITIAL UI LAUNCH TIME.....	15
BENCHMARK 3B – SUBSEQUENT UI LAUNCH TIME	15
BENCHMARK 4 – MEMORY UTILIZATION	16
BENCHMARK 5A – INITIAL IE LAUNCH TIME	16
BENCHMARK 5B – SUBSEQUENT IE LAUNCH TIME	17
BENCHMARK 6 – INSTALLATION TIME	17
BENCHMARK 7 – INSTALLATION SIZE	18
BENCHMARK 8 – REGISTRY KEY COUNT.....	18
BENCHMARK 9 – FILE COPY, MOVE AND DELETE.....	19
BENCHMARK 10 – INSTALLATION OF THIRD PARTY APPLICATIONS	19
BENCHMARK 11 – BINARY FILE DOWNLOAD SPEED	20
BENCHMARK 12 – FILE FORMAT CONVERSION	20
BENCHMARK 13 – FILE COMPRESSION AND DECOMPRESSION.....	21
BENCHMARK 14 – FILE WRITE, OPEN AND CLOSE	21
TEST RESULTS – ANTIVIRUS (AV) PRODUCTS	22
BENCHMARK 1 – BOOT TIME.....	22
BENCHMARK 2 – SCAN SPEED	22
BENCHMARK 3A – INITIAL UI LAUNCH TIME.....	23
BENCHMARK 3B – SUBSEQUENT UI LAUNCH TIME	23
BENCHMARK 4 – MEMORY UTILIZATION	24
BENCHMARK 5A – INITIAL IE LAUNCH TIME	24
BENCHMARK 5B – SUBSEQUENT IE LAUNCH TIME	25
BENCHMARK 6 – INSTALLATION TIME	25

BENCHMARK 7 – INSTALLATION SIZE	26
BENCHMARK 8 – REGISTRY KEY COUNT.....	26
BENCHMARK 9 – FILE COPY, MOVE AND DELETE	27
BENCHMARK 10 – INSTALLATION OF THIRD PARTY APPLICATIONS	27
BENCHMARK 11 – BINARY FILE DOWNLOAD SPEED	28
BENCHMARK 12 – FILE FORMAT CONVERSION	28
BENCHMARK 13 – FILE COMPRESSION AND DECOMPRESSION.....	29
BENCHMARK 14 – FILE WRITE, OPEN AND CLOSE	29
TEST RESULTS – TOTAL SECURITY (TS) PRODUCTS	30
BENCHMARK 1 – BOOT TIME.....	30
BENCHMARK 2 – SCAN SPEED	30
BENCHMARK 3A – INITIAL UI LAUNCH TIME	31
BENCHMARK 3B – SUBSEQUENT UI LAUNCH TIME	31
BENCHMARK 4 – MEMORY UTILIZATION	32
BENCHMARK 5A – INITIAL IE LAUNCH TIME	32
BENCHMARK 5B – SUBSEQUENT IE LAUNCH TIME	33
BENCHMARK 6 – INSTALLATION TIME	33
BENCHMARK 7 – INSTALLATION SIZE	34
BENCHMARK 8 – REGISTRY KEY COUNT.....	34
BENCHMARK 9 – FILE COPY, MOVE AND DELETE	35
BENCHMARK 10 – INSTALLATION OF THIRD PARTY APPLICATIONS	35
BENCHMARK 11 – BINARY FILE DOWNLOAD SPEED	36
BENCHMARK 12 – FILE FORMAT CONVERSION	36
BENCHMARK 13 – FILE COMPRESSION AND DECOMPRESSION.....	37
BENCHMARK 14 – FILE WRITE, OPEN AND CLOSE	37
WHAT THIS REPORT DOESN'T COVER	38
DISCLAIMER & DISCLOSURE	39
DISCLAIMER OF LIABILITY	39
DISCLOSURE.....	39
TRADEMARKS.....	39
CONTACT DETAILS & MORE INFORMATION	39
DOWNLOAD LINK.....	39
APPENDIX 1 – TEST METHOD – HOW DID WE CONDUCT THESE TESTS?	40
COMMON METHODOLOGY	40
BENCHMARK 1 – BOOT TIME.....	40
BENCHMARK 2 – TOTAL SCAN SPEED	40
BENCHMARK 3 – UI LAUNCH SPEED	41
BENCHMARK 4 – MEMORY UTILIZATION	41
BENCHMARK 5 – IE LAUNCH SPEED.....	42
BENCHMARK 6 – INSTALLATION TIME	42
BENCHMARK 7 – INSTALLATION SIZE	42
BENCHMARK 8 – REGISTRY KEY COUNT.....	42
BENCHMARKS 9-14 – REAL-TIME PERFORMANCE.....	43
BENCHMARKS 9 – FILE COPY, MOVE AND DELETE	43
BENCHMARK 10 – THIRD PARTY PROGRAM INSTALLATION.....	44
BENCHMARK 11 – BINARY FILE DOWNLOAD SPEED	44
BENCHMARK 12 – FILE FORMAT CONVERSION (MP3 → WAV, MP3 → WMA)	45
BENCHMARK 13 – FILE COMPRESSION AND DECOMPRESSION.....	45
BENCHMARK 14 – FILE WRITE, OPEN AND CLOSE	46
APPENDIX 2 – TEST ENVIRONMENT.....	47
APPENDIX 3A – INTERNET SECURITY RAW RESULTS.....	48
BOOT TIME.....	48
SCAN SPEED	48
INITIAL UI LAUNCH SPEED.....	49
SUBSEQUENT UI LAUNCH SPEED	49
MEMORY UTILIZATION	50
INITIAL IE LAUNCH SPEED	50

SUBSEQUENT IE LAUNCH SPEED.....	51
INSTALLATION TIME.....	51
INSTALLATION SIZE.....	52
REGISTRY KEY COUNT.....	52
FILE COPY, MOVE AND DELETE	53
THIRD PARTY PROGRAM INSTALLATION	53
BINARY DOWNLOAD SPEED	54
FILE FORMAT CONVERSION.....	54
FILE COMPRESSION AND DECOMPRESSION.....	55
FILE WRITE, OPEN AND CLOSE	55
APPENDIX 3B – ANTIVIRUS RAW RESULTS.....	56
BOOT TIME.....	56
SCAN SPEED	56
INITIAL UI LAUNCH SPEED.....	57
SUBSEQUENT UI LAUNCH SPEED	57
MEMORY UTILIZATION	58
INITIAL IE LAUNCH SPEED.....	58
SUBSEQUENT IE LAUNCH SPEED.....	59
INSTALLATION TIME.....	59
INSTALLATION SIZE.....	60
REGISTRY KEY COUNT.....	60
FILE COPY, MOVE AND DELETE	61
THIRD PARTY PROGRAM INSTALLATION	61
BINARY DOWNLOAD SPEED	62
FILE FORMAT CONVERSION.....	62
FILE COMPRESSION AND DECOMPRESSION.....	63
FILE WRITE, OPEN AND CLOSE	63
APPENDIX 3C – TOTAL SECURITY RAW RESULTS	64
BOOT TIME.....	64
SCAN SPEED	64
INITIAL UI LAUNCH SPEED.....	64
SUBSEQUENT UI LAUNCH SPEED	65
MEMORY UTILIZATION	65
HTTP DOWNLOAD SPEED	65
INITIAL IE LAUNCH SPEED	65
SUBSEQUENT IE LAUNCH SPEED.....	66
INSTALLATION TIME.....	66
INSTALLATION SIZE.....	66
REGISTRY KEY COUNT.....	66
FILE COPY, MOVE AND DELETE	67
THIRD PARTY PROGRAM INSTALLATION	67
BINARY DOWNLOAD SPEED	67
FILE FORMAT CONVERSION.....	67
FILE COMPRESSION AND DECOMPRESSION.....	68
FILE WRITE, OPEN AND CLOSE	68

REVISION HISTORY

Revision	Revision History	Date
Draft 1	Initial version of this document. Major items missing from this draft are: the high level result summary, some raw results and some of the detailed descriptions of the metrics used.	29 August 2008
Draft 2	Added missing raw results, methodology descriptions of the metrics used and notes about results. Corrected minor cut/paste errors, some refinement of wording. Missing high level results summary.	2 September 2008
Edition 1	First public release of this document. Added Overall Ranking of Products by Category and updated graphs/raw results. Corrected minor formatting errors.	8 September 2008

REFERENCES

Ref #	Document	Author	Date
1	Antivirus Performance Report for Windows Vista (Edition 2)	D. Wren and M. Fryer, PassMark Software	6 June 2008
2	What Really Slows Windows Down	O. Warner, The PC Spy	2001-2008

Executive Summary

PassMark has executed performance benchmark testing on thirty-one Antivirus, Internet Security and Total Security products from various vendors between July and August 2008. The results within this document are intended to complement and extend previous test results collected by PassMark for Symantec in March 2008 (please see ***Reference #1: Antivirus Performance Report for Windows Vista, Edition 2***).

PassMark will continue to execute performance benchmark testing on selected 2009 versions of Antivirus, Internet Security and Total Security products during September and October 2008. A follow-up report comparing the findings in this report with our new results will be released later this year.

Testing was performed on all products using several new performance metrics. The new metrics were:

- Installation Size.
- Installation Time.
- Registry Key Count.
- Copying, moving and deleting different types of common files.
- Installing third party applications.
- Downloading binary files from websites.
- File format conversion.
- File compression and decompression.
- File write, open and close.

For twelve previously untested products, measurements were also made against the original performance metrics:

- Boot time.
- Total Scan speed.
- UI launch speed (initial and subsequent).
- Memory utilization.
- IE launch speed (initial and subsequent).

These tests were not re-executed for products tested in October 2007. For these products, we have included our results from last year as part of our findings in this report for ease of comparison between products.

No attempt was made to measure the effectiveness of threat detection, as this aspect of the products is covered by other industry benchmarks such as Virus Bulletin (<http://www.virusbtl.com>) and AV Comparatives (<http://www.av-comparatives.org>). This report is solely focused on measuring how responsive the applications are and by how extensively the applications utilize the resources of the machine.

Testing was performed on a dual core Vista machine; the same machine used in previous testing. The products themselves are divided into three groups:

- **Antivirus (AV)** products are defined in this report as products which are primarily focused on detecting and remediating viruses and spyware.
- **Internet Security (IS)** products provides all the virus and spyware removal features of an AV, as well as additional functions to provide greater Internet protection. These features may include protection against phishing, root kit detection, firewalls and scanning of web pages and HTTP data.
- **Total Security (TS)** products provide data migration and backup features on top of all security features common to IS products.

Overall Ranking by Product Category

In the following tables, the products have been ranked by their overall score in comparison to other products from that category. The Best Possible Score represents a category's maximum score, i.e. the score of a hypothetical product which has ranked first in every test in that category. This figure varies between categories because different amounts of products were tested for each category (IS: 10, AV: 12, TS: 5), for example, in the Total Security category, the best possible score would be 80 (5 products x 16 tests).

Internet Security (IS) Products

Product Name	Score
Norton Internet Security 2009	154
ESET Smart Security 2008	154
Kaspersky Internet Security 8	141
AVG Internet Security 2008	129
Panda Internet Security 2008	129
Norton Internet Security 2008	115
F-Secure Internet Security 2009 BETA	112
McAfee Internet Security 2008	111
G-Data Internet Security 2008	108
Trend Micro Internet Security 2008	97
<i>Best Possible Score</i>	176

Antivirus (AV) Products

Product Name	Score
Norton Antivirus 2009	145
ESET NOD32 Antivirus 3.0	143
Avira AntiVir Free AV 8	129
Avast! Antivirus 4.8	124
Rising Security Antivirus	116
Kaspersky Antivirus 8	101
SourceNext Virus Security ZERO 2008	99
AVG Free AV&AS 2008	94
Norton Antivirus 2008	94
Trend Micro Antivirus 2008	75
G-Data Antivirus 2008	64
McAfee VirusScanPlus 2008	64
<i>Best Possible Score</i>	192

Total Security (TS) Products

Product Name	Score
Norton 360 v2	54
Windows OneCare 2.0	52
BitDefender Total Security 2008	49
McAfee Total Protection 2008	48
Trend Micro IS Pro 2008	37
<i>Best Possible Score</i>	<i>80</i>

Products Tested

This report compares our results for the following versions of products:

Internet Security (IS) Products

Manufacturer	Product Name	Product Version	Date Tested	Test type
Symantec Corporation	Norton Internet Security 2008	15.0.0.60	Aug 08	Incremental
Symantec Corporation	Norton Internet Security 2009	16.0.0.125	Sep 08	Full
Kaspersky Labs	Kaspersky Internet Security 8 (2009)	8.0.0.357	Jul 08	Full
McAfee Inc	McAfee Internet Security 2008	8.1.175	Aug 08	Full
AVG Technologies	AVG Internet Security 2008	8.0.138	Jul 08	Full
Trend Micro Ltd.	Trend Micro Internet Security 2008	16.10.1079	Jul 08	Incremental
G Data Software	G Data Internet Security 2008	18.0.7227.533	Jul 08	Incremental
ESET	ESET Smart Security 2008	3.0.650.0	Aug 08	Incremental
F-Secure	F-Secure Internet Security 2009 [BETA]	8.40.128	Aug 08	Full
Panda Security	Panda Internet Security 2008	12.00.00	Aug 08	Incremental

Antivirus (AV) Products

Manufacturer	Product Name	Product Version	Date Tested	Test type
Symantec Corporation	Norton Antivirus 2008	15.5.0.23	Aug 08	Incremental
Symantec Corporation	Norton Antivirus 2009	16.0.0.125	Sep 08	Full
Kaspersky Labs	Kaspersky Antivirus 8 (2009)	8.0.0.357	Jul 08	Full
McAfee Inc.	McAfee VirusScanPlus 2008	12.1.110	Aug 08	Incremental
AVG Technologies	AVG Free AV&AS 2008	8.138.1332	Jul 08	Full
Trend Micro Ltd.	Trend Micro Antivirus 2008	16.10.1079	Jul 08	Incremental
SourceNext Corporation	SourceNext Virus Security ZERO 2008	9.4.00	Aug 08	Incremental
G Data Software	G-Data Antivirus 2008	18.0.7227.533	Jul 08	Incremental
ESET	ESET NOD32 Antivirus 3.0	3.0.667.0	Jul 08	Full
Avira gmbH	Avira AntiVir Free AV 8	8.1.0.326	Jul 08	Full
ALWIL Software	Avast! Antivirus 4.8	4.8.1229	Jul 08	Full
Beijing Rising Int. Software Co.	Rising Security Antivirus	20.55.11	Jul 08	Full

Total Security (TS) Products

Manufacturer	Product Name	Product Version	Date Tested	Test type
Symantec Corporation	Norton 360 v2	2.3.1.4	Jul 08	Incremental
McAfee Inc.	McAfee Total Protection 2008	8.0.244	Jul 08	Incremental
Microsoft	Windows OneCare 2.0	2.5.2900.03	Aug 08	Incremental
Trend Micro Ltd.	Trend Micro IS Pro 2008	16.10.1079	Aug 08	Incremental
BitDefender	BitDefender Total Security 2008	10.0.17	Aug 08	Incremental

Original Set of Metrics – Criteria Measured

This original set of metrics was used in the previous test. These metrics were selected because they provided an indication of the product's performance in a number of key areas which impacted on the user experience. All metrics are objective and can be replicated and reproduced by third parties if required.

Please see '*Appendix 1 – Test method – How did we conduct these tests?*' for detailed test methodologies.

Benchmark 1 – Boot Time

The time taken for the machine to boot was measured. It is typical for antiviral or security suite applications to be launched at Windows start-up. This typically adds some amount of time to the boot time for the machine. Our aim was to measure the additional time added to the boot process as a result of installing these applications. Shorter boot times indicate that the application has less impact on the normal operation of the machine.

Benchmark 2 – Scan Speed

All these products have functionality designed to detect viruses and various other forms of malware by scanning files on the system. This test measured the amount of time required to scan a typical set of clean files. The sample set used against all products was 1.2GB worth of data, made up of typical Window's files from the Windows system folder and Office files.

Benchmark 3 – User Interface Launch Speed

The time taken to start the User Interface of the product was measured. This is one measure of how responsive an application appears to a user. Both the initial launch time and the subsequent launch times, to allow for caching effects, were measured. For simplicity only the more critical initial times are used in this report.

Benchmark 4 – Memory Utilization

The amount of RAM used by the product was measured while the machine and product were in an idle state, running in the background. All processes used by the application were identified and the total RAM usage calculated. The less RAM an application uses while resident in the background the better. Idle state measurements were made, as opposed to RAM used while actively scanning, because it is easier to measure the stable idle state and the aim was to see what resources were being used on a permanent basis.

Benchmark 5 – IE launch Speed

The time taken to start the user interface of Internet Explorer was measured. This is one measure of how the product impacts on the responsiveness of the system. Both the initial launch time and the subsequent launch times, to allow for caching effects, were measured. For simplicity only the more critical initial times are used in this report.

New Set of Metrics – Criteria Measured

New to this report, this additional set of metrics was selected to supplement and extend the initial set of metrics in testing to a user's experience of a software product. These new benchmarks include installation speed, the amount of installation space a product will occupy on a user's hard drive and the amount of keys added to the Registry after installation.

Benchmarks 9 through to 14 comprise of a script-based "performance obstacle course". Each of these benchmarks were designed to provide performance results in the context of the end user experience by mimicking performance of tasks that end users may perform on a real-time or daily basis.

Please refer to '*Appendix 1 – Test method – How did we conduct these tests?*' for detailed test methodologies.

Benchmark 6 – Installation Time

It is important that a user has good first impressions of a product. The speed and ease of the installation process will strongly impact this initial experience. This test measures the minimum Installation Time a product requires to be fully functional and ready for use by the end user. Lower times represent products which are quicker for a user to install.

Benchmark 7 – Installation Size

New technologies push the size limits of hard drives every year. Despite this, the installation size test remains popular among reviewers and home users alike due to its ease of replication. A product's Installation Size has been defined as the difference between the snapshot of the Disk Space (C: drive) before and after the product is installed on the system. The smaller the difference is between these disk space snapshots, the less disk space a product will take up on a user's hard disk.

Benchmark 8 – Registry Key Count

A large registry increases a machine's use of resources. This is likely to negatively impact system performance, especially on much older machines. This test measures the amount of keys and values added to registry, after rebooting the test machines, following a successful product installation. Lower numbers mean that a product has had less impact on the registry.

Benchmark 9 – File Copy, Move and Delete

This metric measured the amount of time required 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 10 – Installing Third Party Applications

This metric measured the amount of time required to install and uninstall third party programs.

Benchmark 11 – Binary File Download Speed

The metric measured the amount of time required to download a variety of binary files through HTTP. Binary files used in this test include file formats that users would typically download from the web such as images, archives, music files and movie files.

Benchmark 12 – File Format Conversion

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

Benchmark 13 – File Compression and Decompression

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

Benchmark 14 – File Write, Open and Close

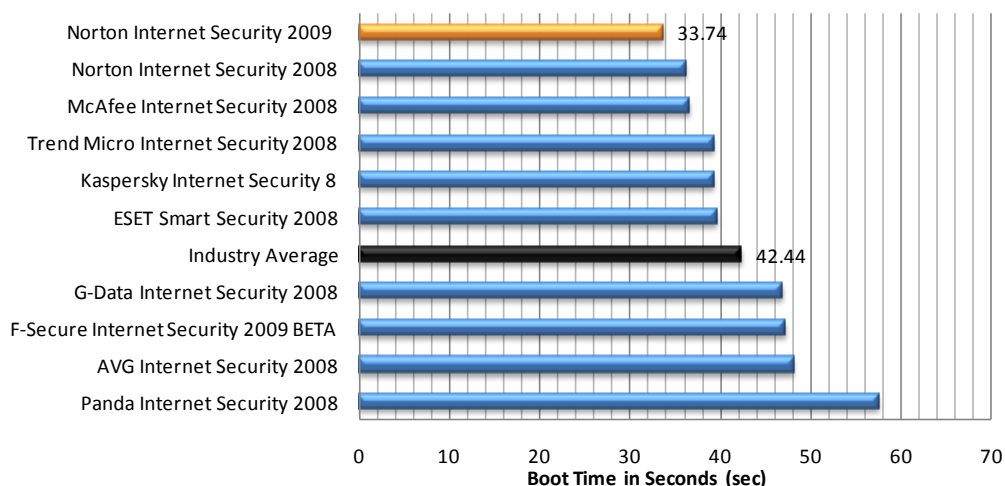
This benchmark was derived from Oli Warner's File I/O test at <http://www.thepcspy.com> (please see *Reference #2: What Really Slows Windows Down*). This metric measures the amount of time required for the system to write a file, then open and close that file.

Test Results – Internet Security (IS) Products

In the following charts, we have highlighted the results we obtained for Norton Internet Security 2009 in orange. For ease of comparison, we have also highlighted industry averages in black.

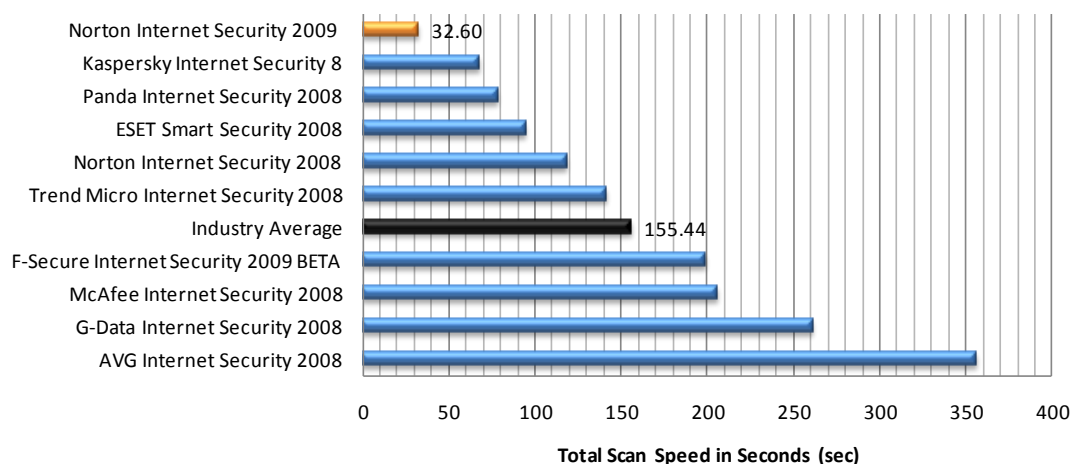
Benchmark 1 – Boot Time

The following chart compares the average system boot time (from a sample of 15 boots) for each Internet Security product we tested. Products with lower boot times are considered better performing products in this category.



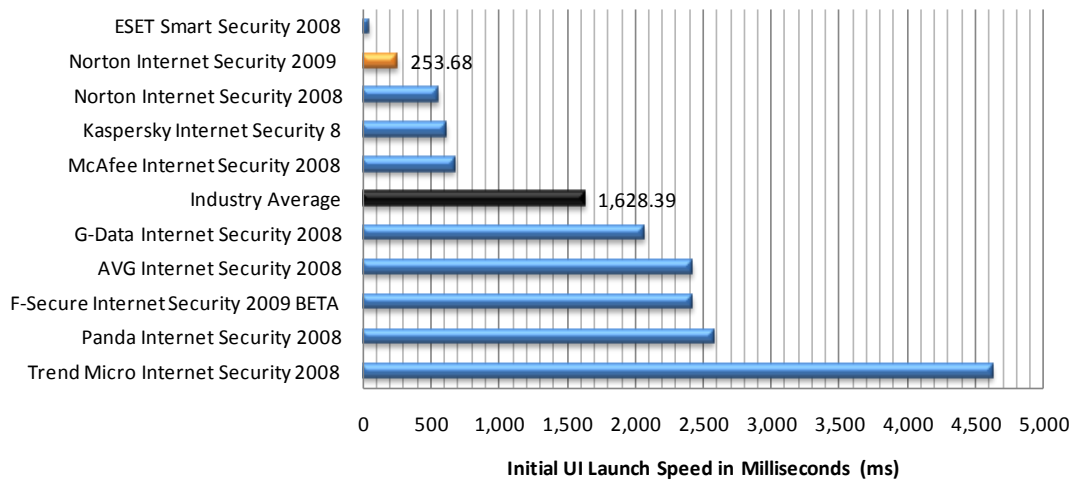
Benchmark 2 – Scan Speed

The following chart compares the average scan time of 6159 files (totaling 982MB) for each Internet Security product we tested. This time is calculated by averaging the initial (Run 1) and subsequent (Runs 2-5) scan times. Products with lower scan times are considered better performing products in this category.



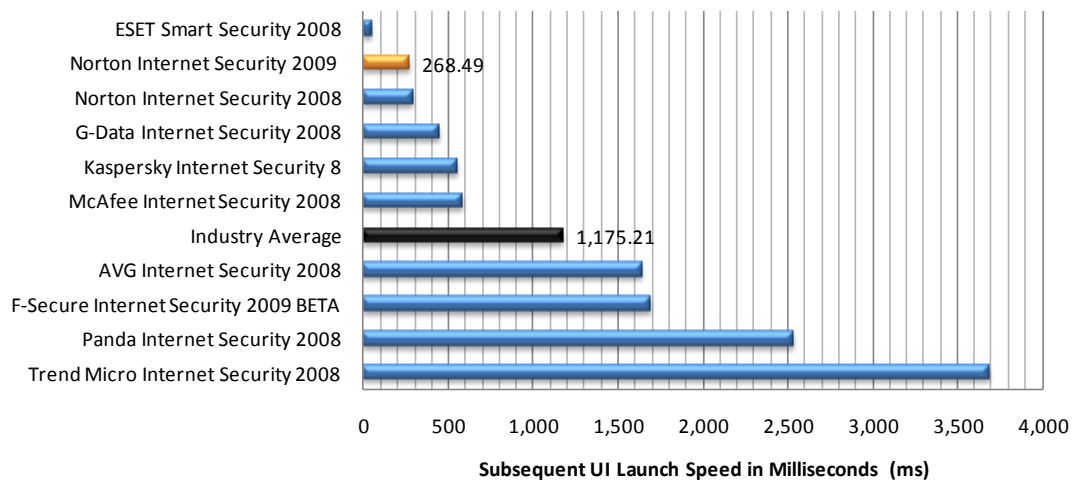
Benchmark 3a – Initial UI Launch Time

The following chart compares the average launch times of the User Interface (after rebooting the machine) for each Internet Security product we tested. Products with lower UI launch times are considered better performing products in this category.



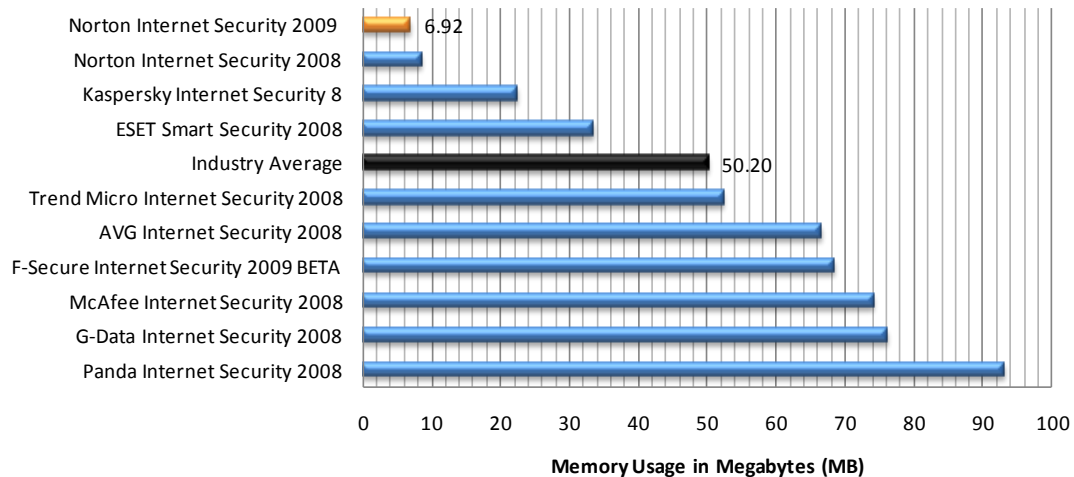
Benchmark 3b – Subsequent UI Launch Time

The following chart compares the average launch times of the User Interface by restarting the Internet Security application (without rebooting the machine) for each Internet Security product tested. Lower times are better. Products with lower UI launch times are considered better performing products in this category.



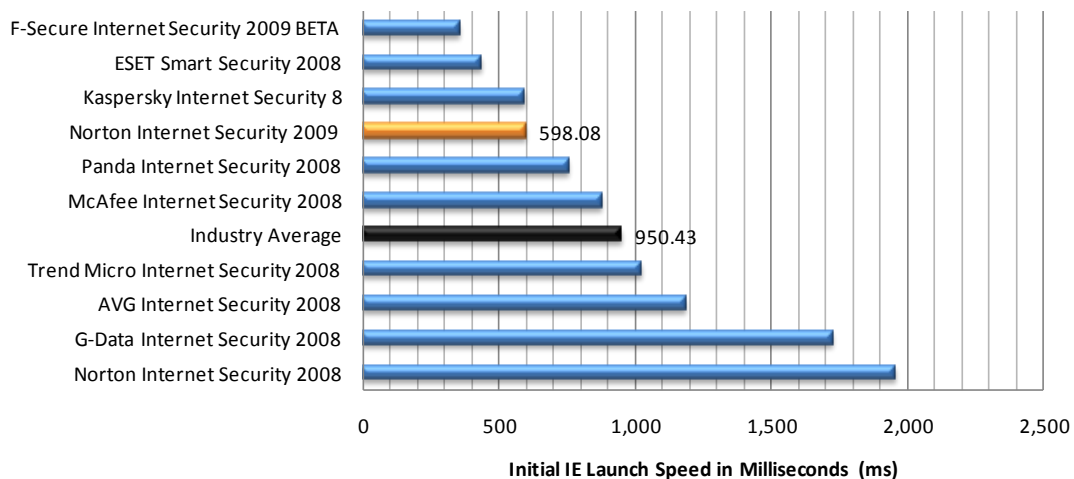
Benchmark 4 – Memory Utilization

The following chart compares the average amount of RAM used while idle for each Internet Security product tested. This average is taken from a sample of ten memory snapshots taken at roughly 60 seconds apart after reboot. Products with lower idle RAM usage are considered better performing products in this category.



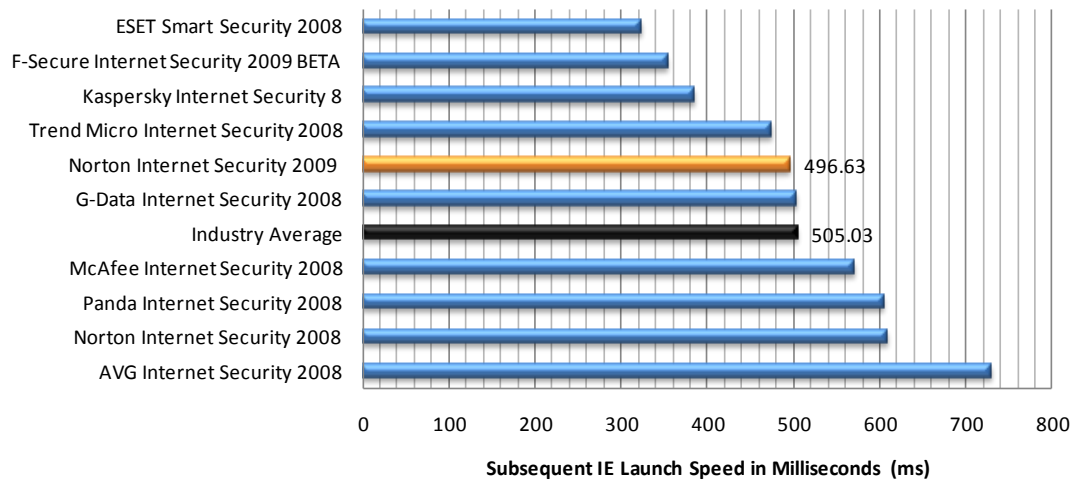
Benchmark 5a – Initial IE Launch Time

The following chart compares the average launch times of Internet Explorer after rebooting the machine for each Internet Security product we tested. Products with lower IE launch times are considered better performing products in this category.



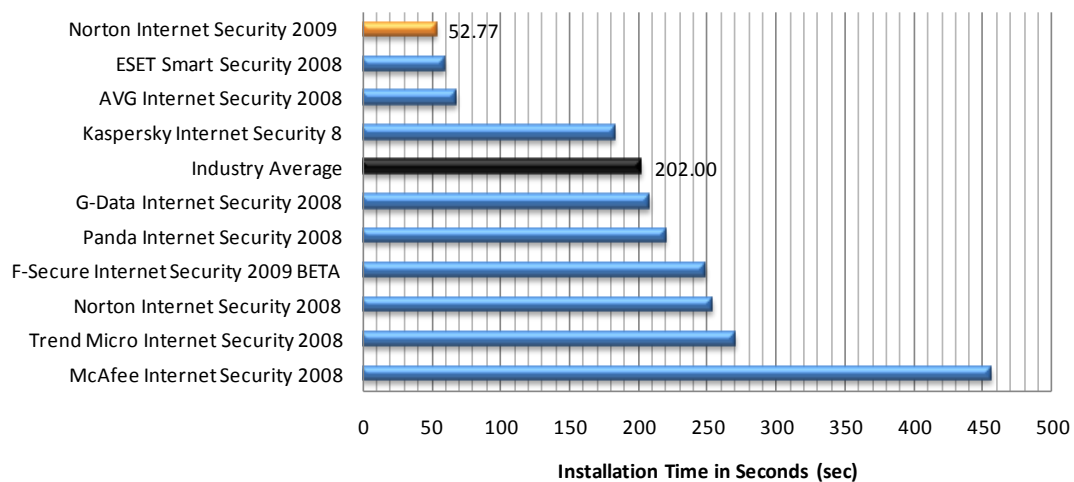
Benchmark 5b – Subsequent IE Launch Time

The following chart compares the average launch times of Internet Explorer after application restart (without rebooting the machine) for each Internet Security product we tested. Products with lower IE launch times are considered better performing products in this category.



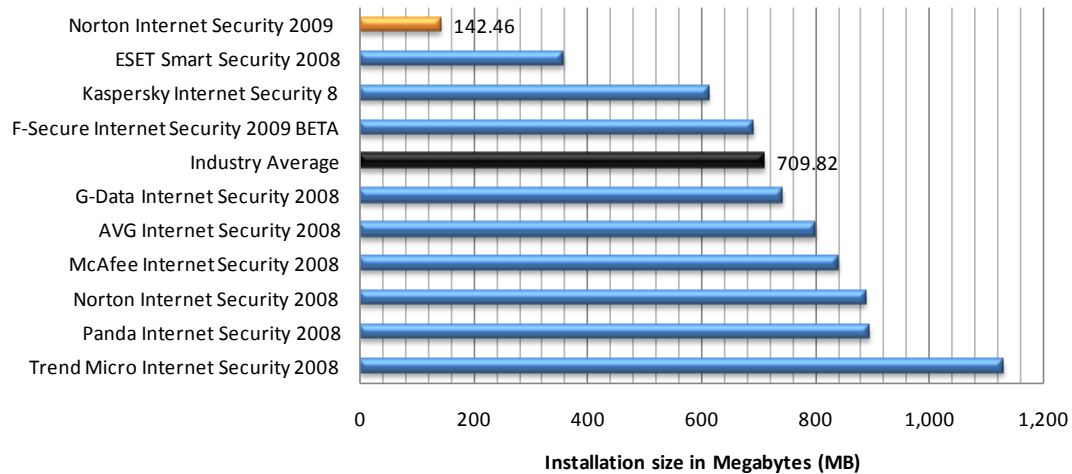
Benchmark 6 – Installation Time

The following chart compares the minimum installation time it takes for Internet Security products to be fully functional and ready for use by the end user. Products with lower installation times are considered better performing products in this category.



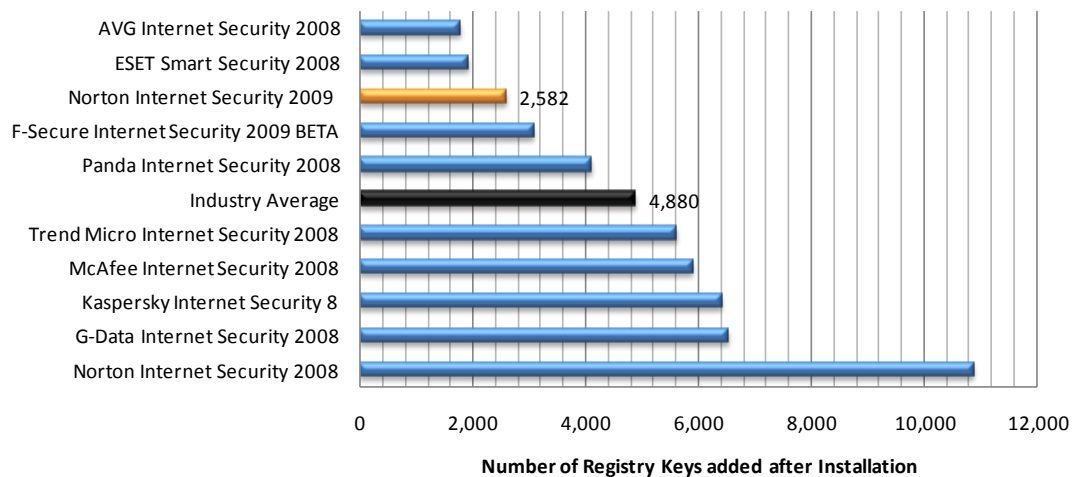
Benchmark 7 – Installation Size

The following chart compares the installation sizes of Internet Security products. Products with lower installation sizes are considered better performing products in this category.



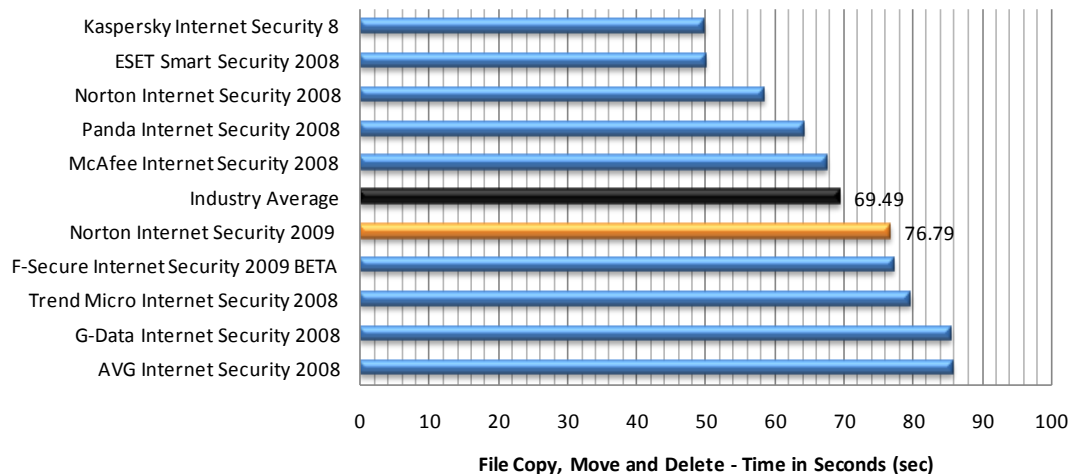
Benchmark 8 – Registry Key Count

The following chart compares the amount of Registry Keys created during product installation, for each Internet Security product we tested. Products with lower key counts are considered better performing products in this category.



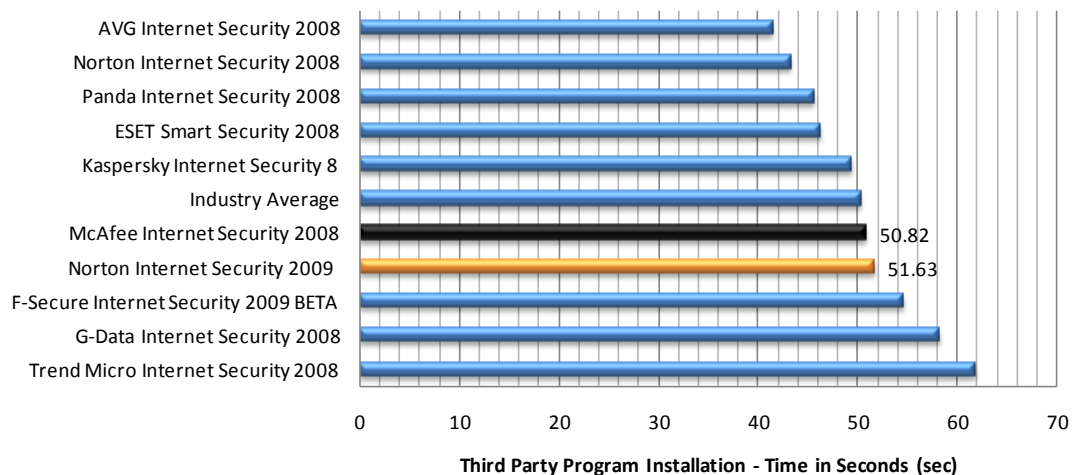
Benchmark 9 – File Copy, Move and Delete

The following chart compares the average speed of file copying, moving and deleting for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



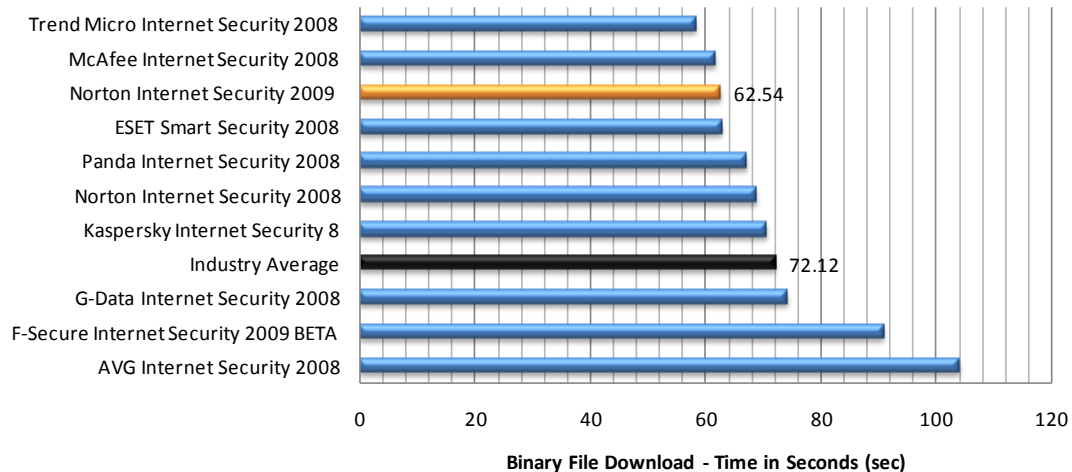
Benchmark 10 – Installation of Third Party Applications

The following chart compares the average speed of installation of third party applications for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



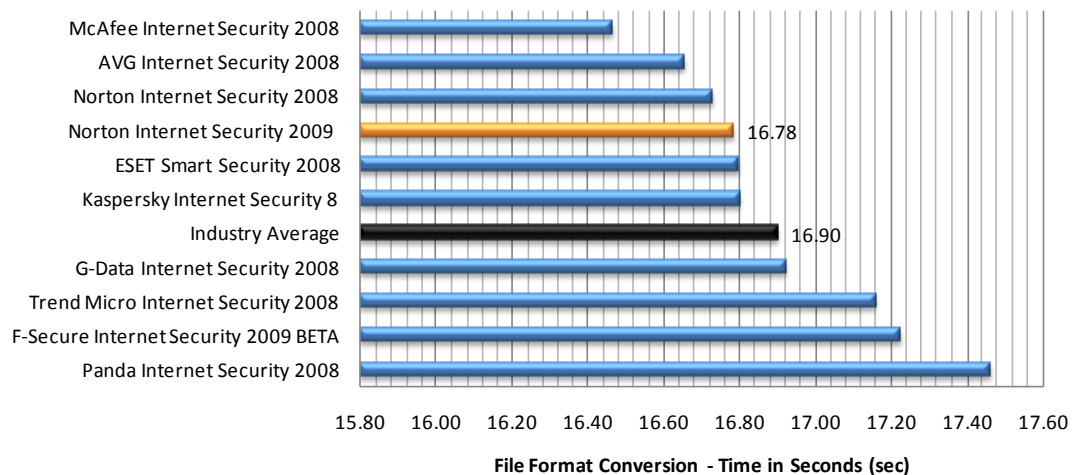
Benchmark 11 – Binary File Download Speed

The following chart compares the average speed of HTTP downloads of common file types for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



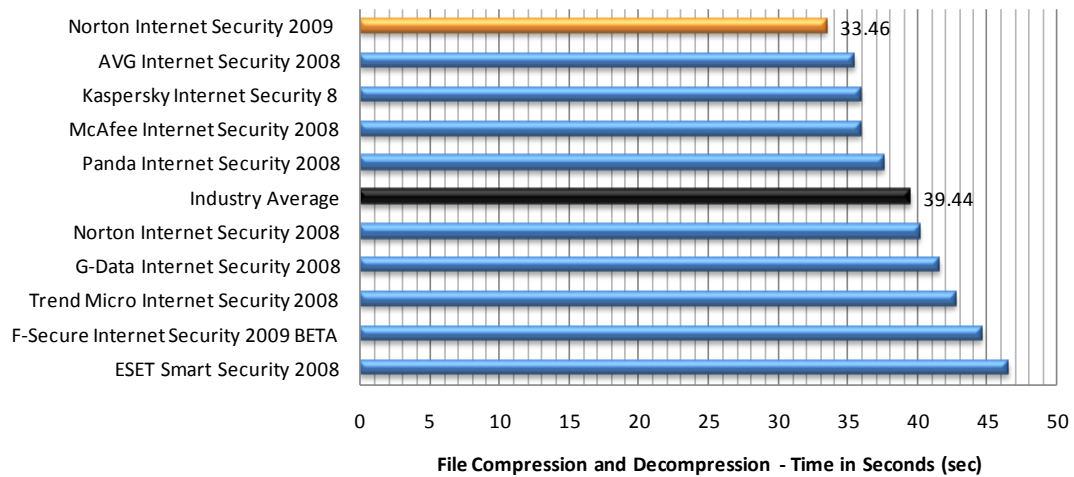
Benchmark 12 – File Format Conversion

The following chart compares the average speed at which files can be converted from one file format to another (MP3 ↔ WMA, MP3 ↔ WAV) for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



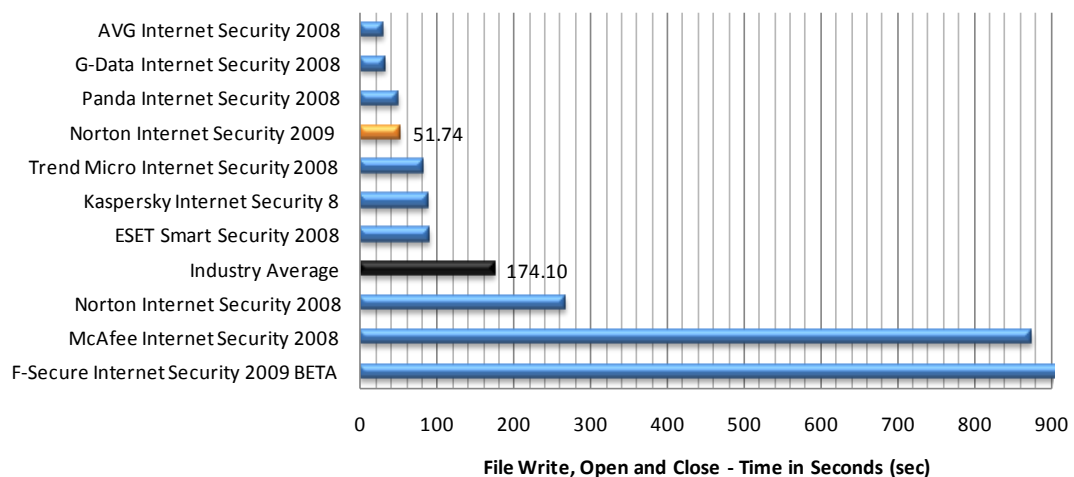
Benchmark 13 – File Compression and Decompression

The following chart compares the average speed at which files can be compressed and decompressed for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



Benchmark 14 – File Write, Open and Close

The following chart compares the average speed at which a file can be written to the hard drive, then opened and closed, for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



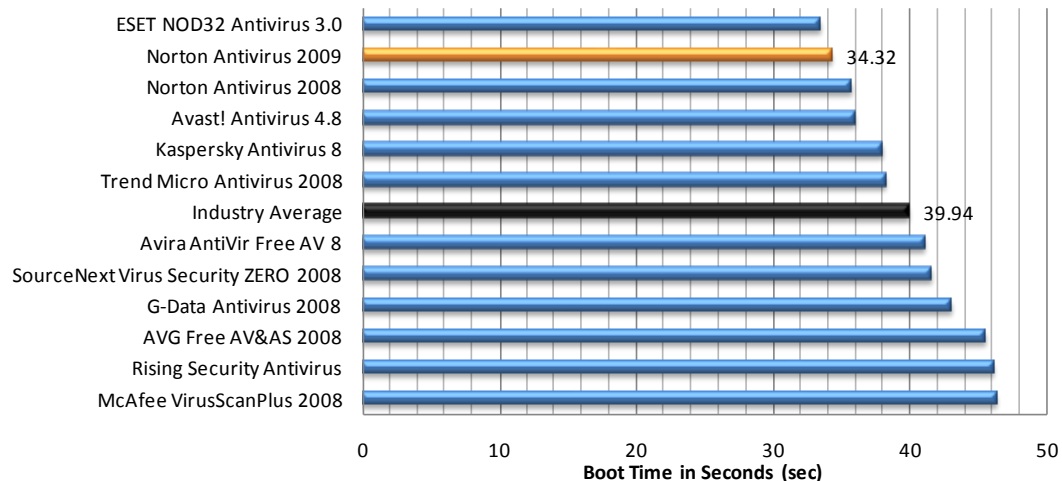
* **F-Secure Internet Security 2009 Beta** performed abnormally poorly in this category when compared to other products (over 3,400 seconds on average to execute the test). The industry average excludes this result and the chart has been rescaled to emphasize the differences between the remaining products.

Test Results – Antivirus (AV) Products

In the following charts, we have highlighted the results we obtained for Norton Antivirus 2009 in orange. For ease of comparison, we have also highlighted industry averages in black.

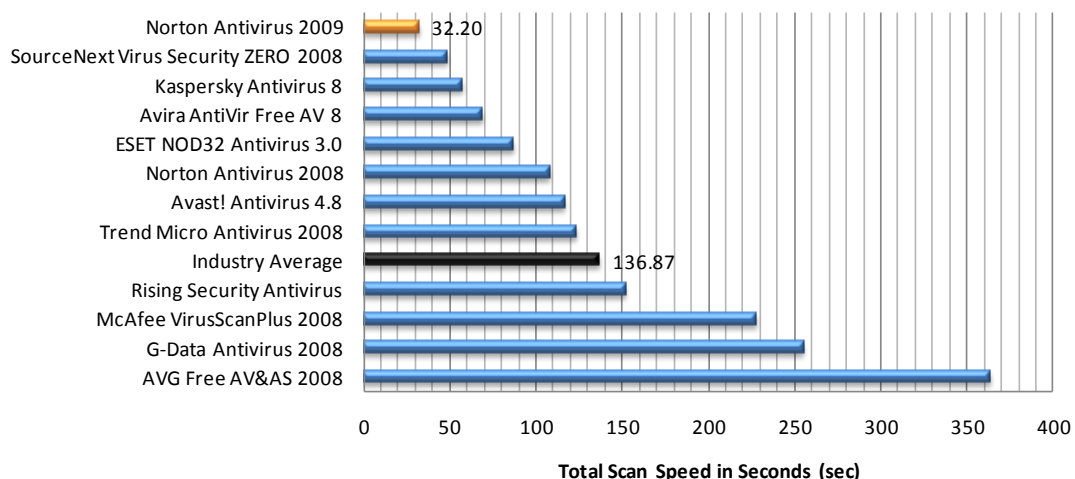
Benchmark 1 – Boot Time

The following chart compares the average system boot time (from a sample of 15 boots) for each Internet Security product we tested. Products with lower boot times are considered better performing products in this category.



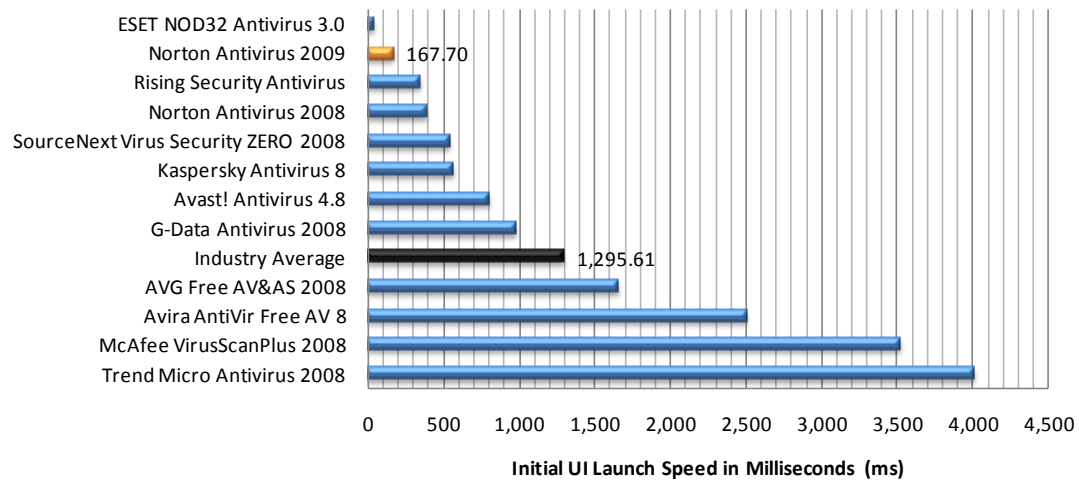
Benchmark 2 – Scan Speed

The following chart compares the average scan time of 6159 files (totaling 982MB) for each Internet Security product we tested. This time is calculated by averaging the initial (Run 1) and subsequent (Runs 2-5) scan times. Products with lower scan times are considered better performing products in this category.



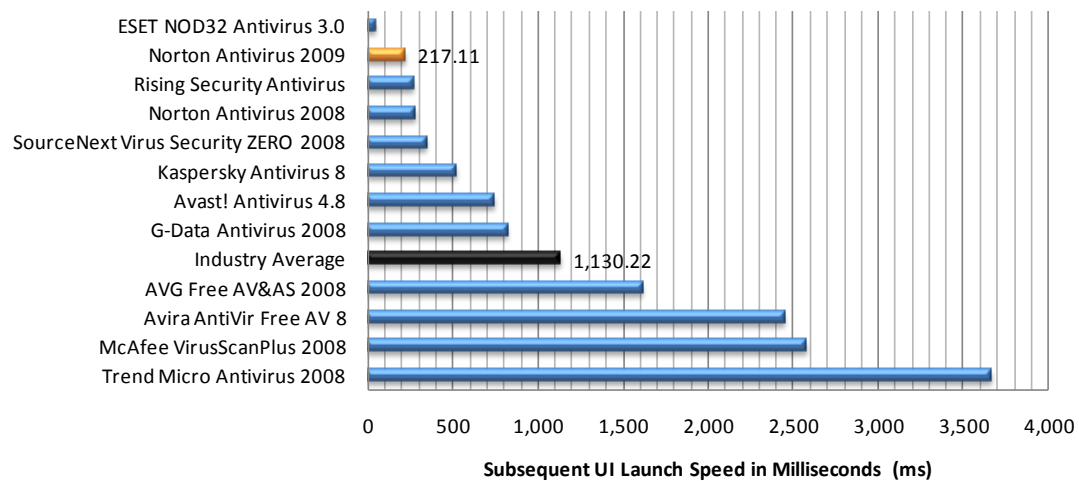
Benchmark 3a – Initial UI Launch Time

The following chart compares the average launch times of the User Interface (after rebooting the machine) for each Internet Security product we tested. Products with lower UI launch times are considered better performing products in this category.



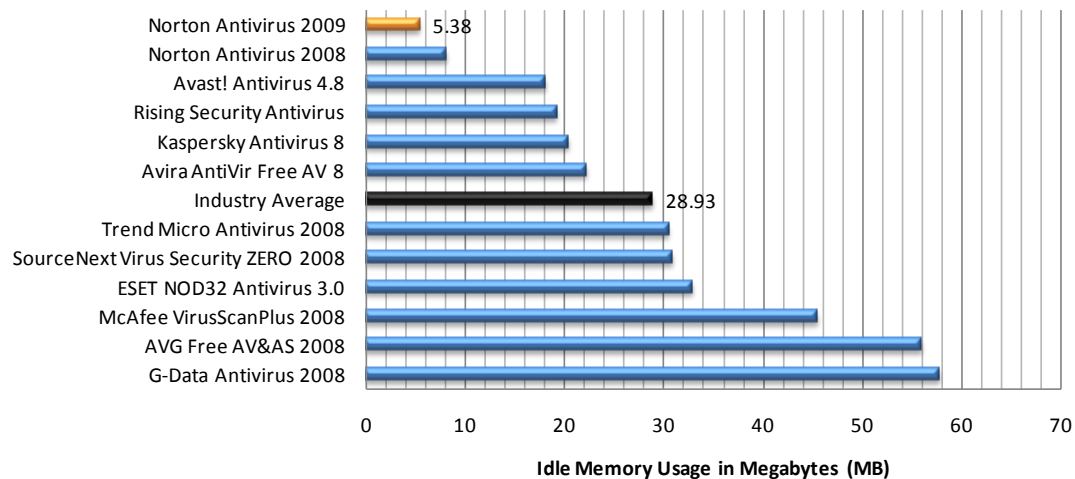
Benchmark 3b – Subsequent UI Launch Time

The following chart compares the average launch times of the User Interface by restarting the Internet Security application (without rebooting the machine) for each Internet Security product tested. Lower times are better. Products with lower UI launch times are considered better performing products in this category.



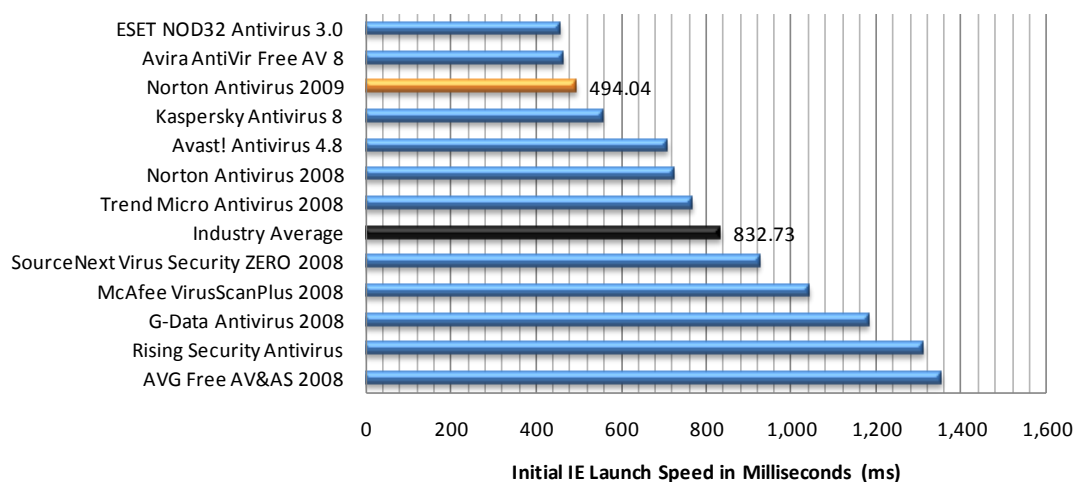
Benchmark 4 – Memory Utilization

The following chart compares the average amount of RAM used while idle for each Internet Security product tested. This average is taken from a sample of ten memory snapshots taken at roughly 60 seconds apart after reboot. Products with lower idle RAM usage are considered better performing products in this category.



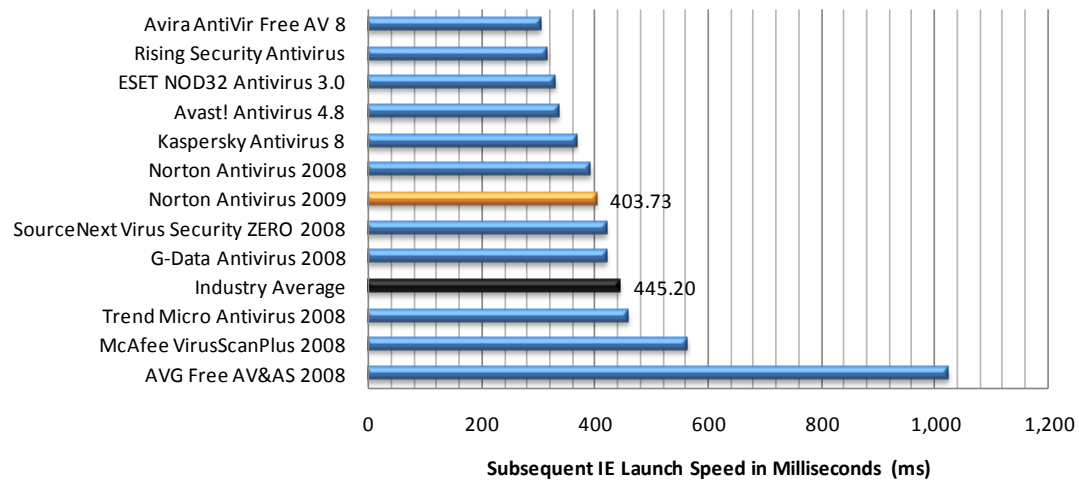
Benchmark 5a – Initial IE Launch Time

The following chart compares the average launch times of Internet Explorer after rebooting the machine for each Internet Security product we tested. Products with lower IE launch times are considered better performing products in this category.



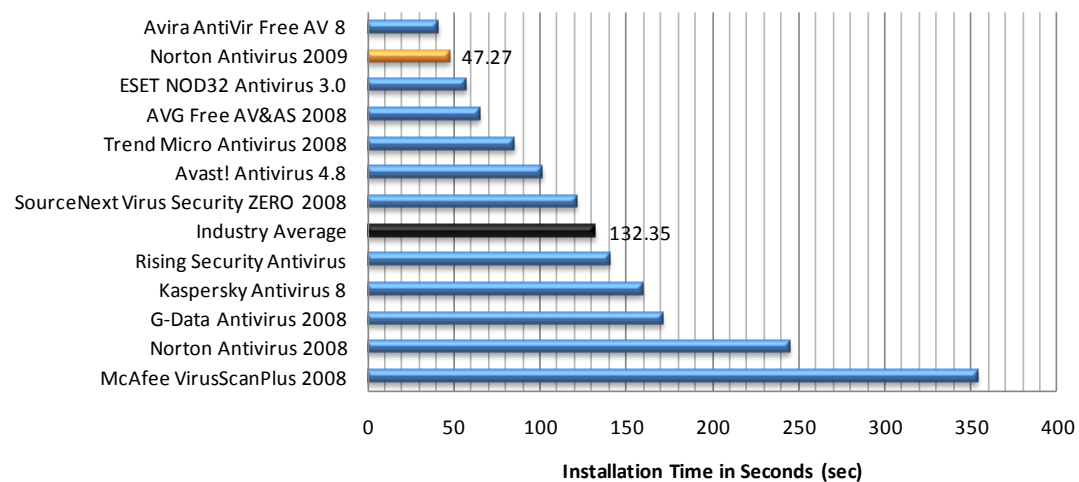
Benchmark 5b – Subsequent IE Launch Time

The following chart compares the average launch times of Internet Explorer after application restart (without rebooting the machine) for each Internet Security product we tested. Products with lower IE launch times are considered better performing products in this category.



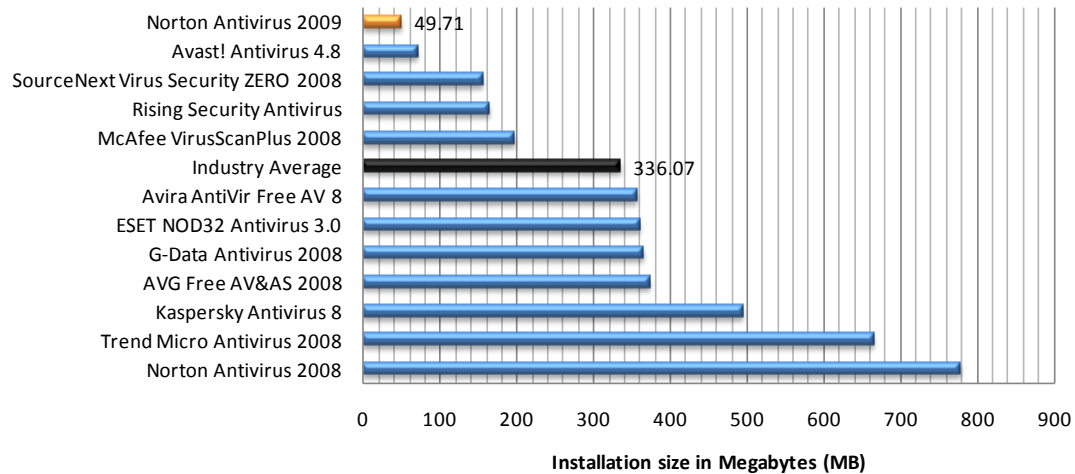
Benchmark 6 – Installation Time

The following chart compares the minimum installation time it takes for Internet Security products to be fully functional and ready for use by the end user. Products with lower installation times are considered better performing products in this category.



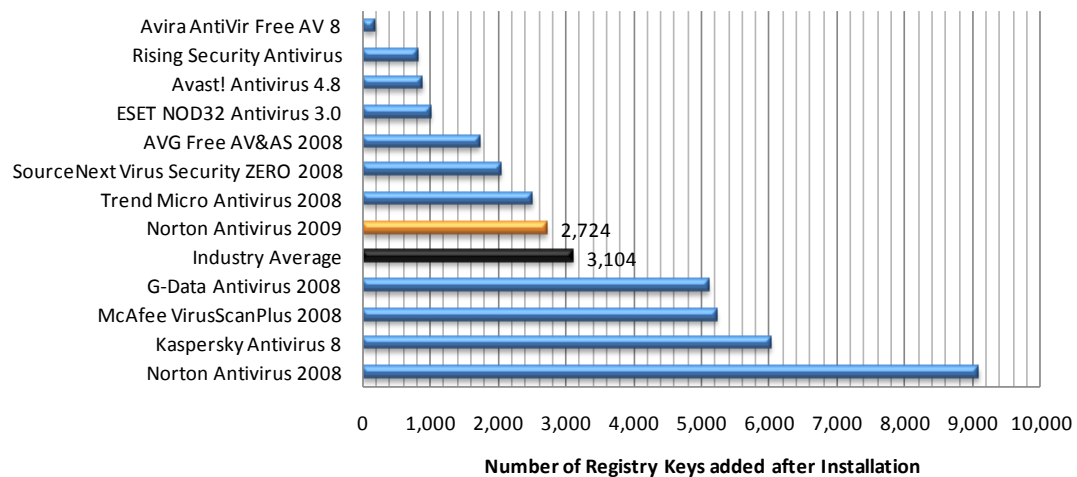
Benchmark 7 – Installation Size

The following chart compares the installation sizes of Internet Security products. Products with lower installation sizes are considered better performing products in this category.



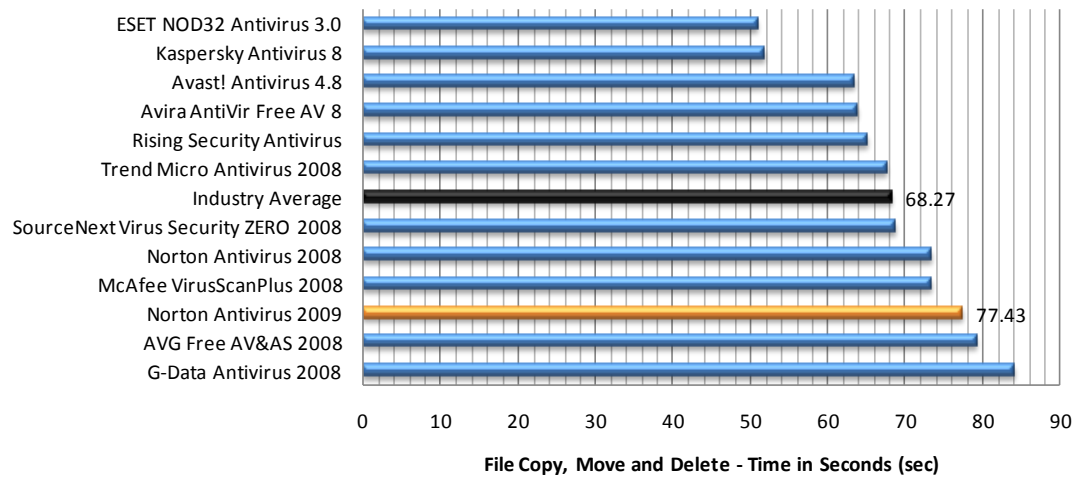
Benchmark 8 – Registry Key Count

The following chart compares the amount of Registry Keys created during product installation, for each Internet Security product we tested. Products with lower key counts are considered better performing products in this category.



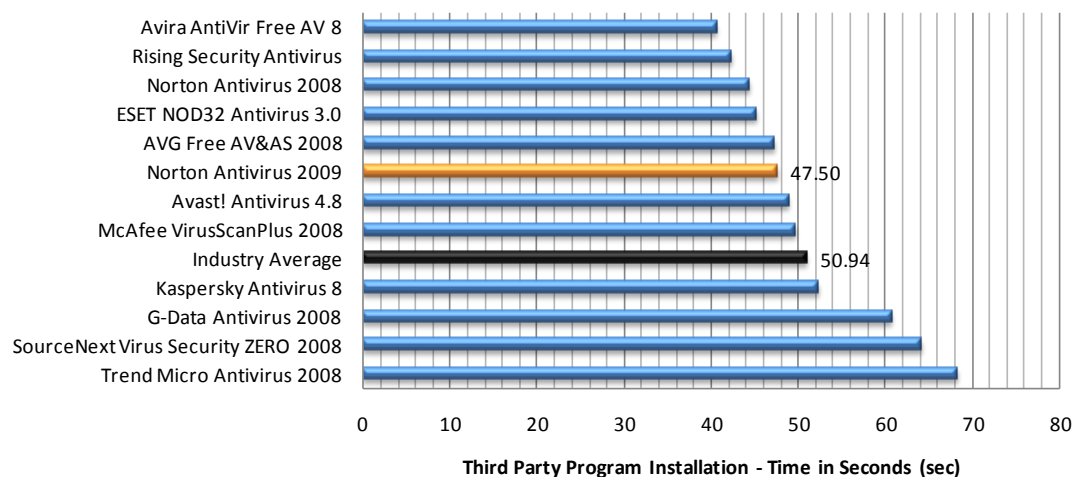
Benchmark 9 – File Copy, Move and Delete

The following chart compares the average speed of file copying, moving and deleting for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



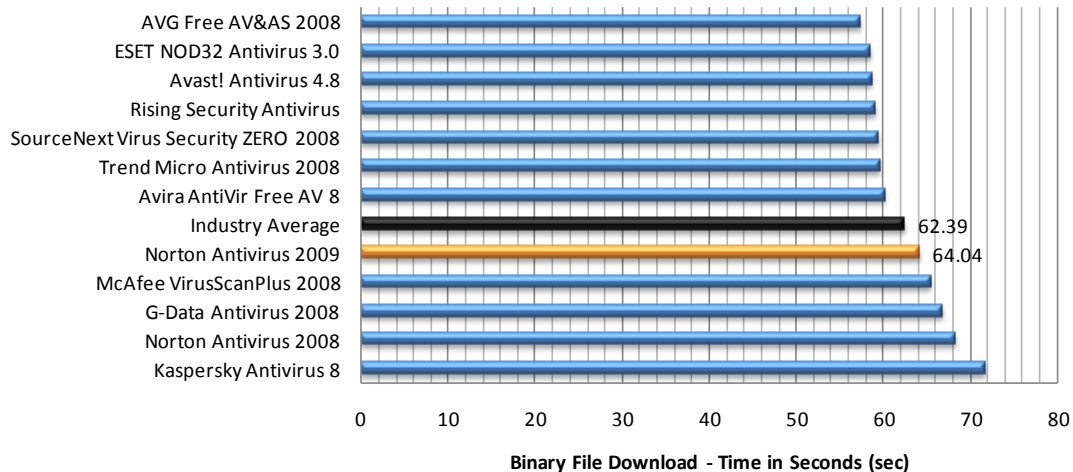
Benchmark 10 – Installation of Third Party Applications

The following chart compares the average speed of installation of third party applications for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



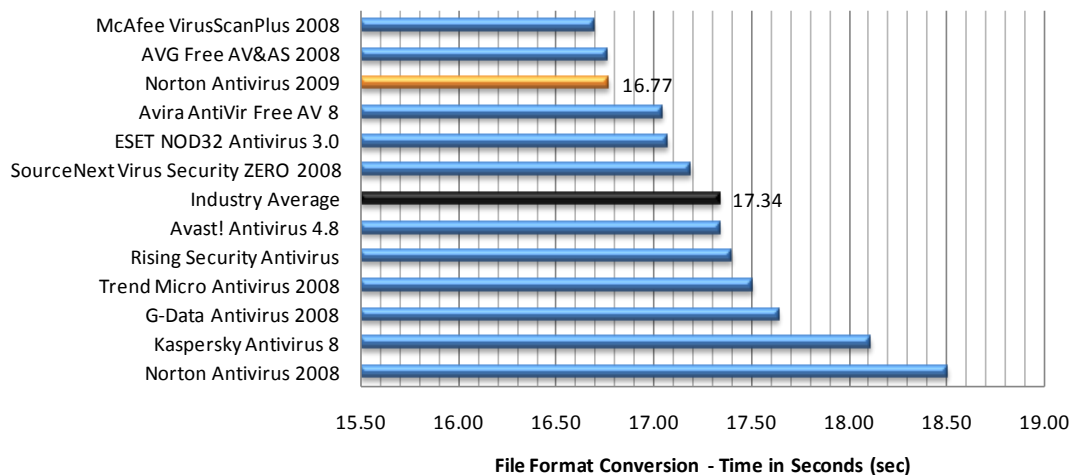
Benchmark 11 – Binary File Download Speed

The following chart compares the average speed of HTTP downloads of common file types for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



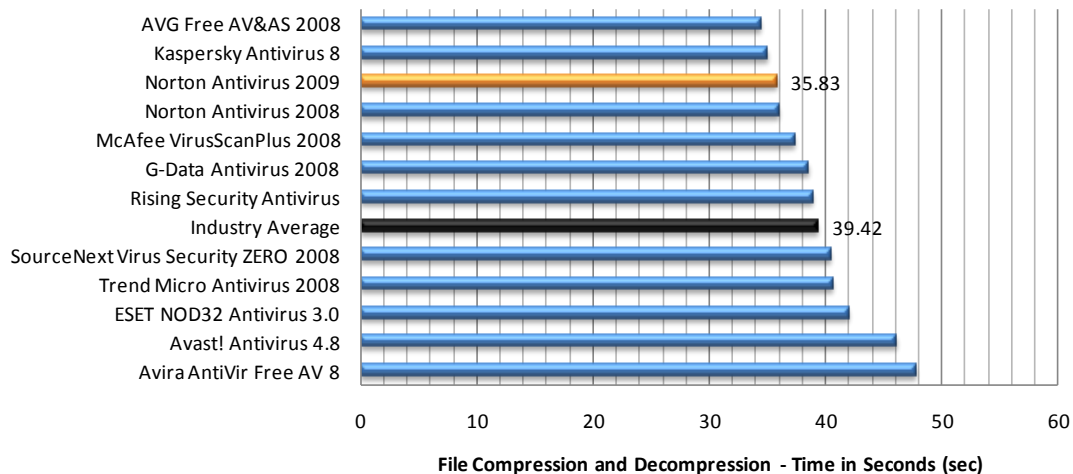
Benchmark 12 – File Format Conversion

The following chart compares the average speed at which files can be converted from one file format to another (MP3 ↔ WMA, MP3 ↔ WAV) for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



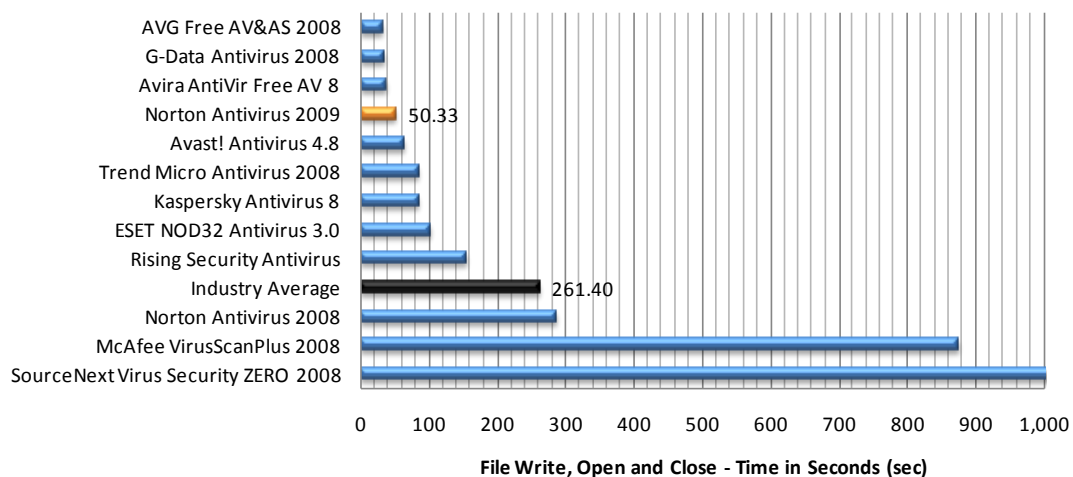
Benchmark 13 – File Compression and Decompression

The following chart compares the average speed at which files can be compressed and decompressed for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



Benchmark 14 – File Write, Open and Close

The following chart compares the average speed at which a file can be written to the hard drive, then opened and closed, for each Internet Security product we tested. Products with lower times are considered better performing products in this category.



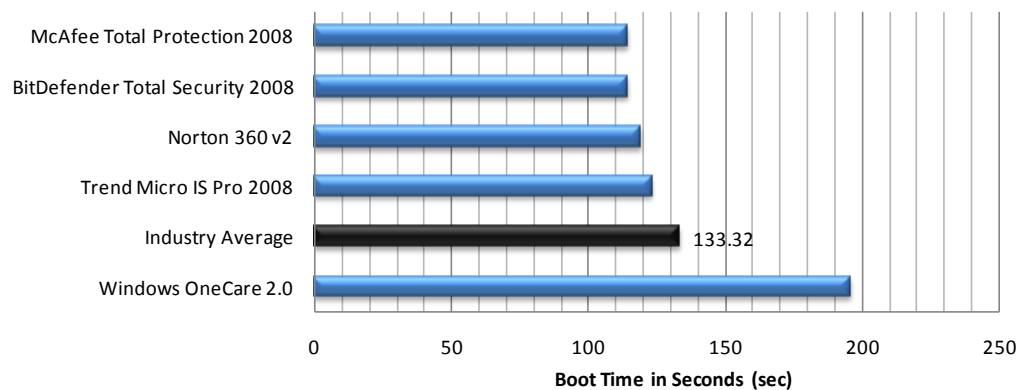
* **SourceNext Virus Security ZERO 2008** performed relatively poorly in this category when compared to other products (around 1,300 seconds on average to execute the test). While this result has been included in the average, the chart has been rescaled to emphasize the differences between the remaining products.

Test Results – Total Security (TS) Products

For ease of comparison, we have highlighted industry averages in black.

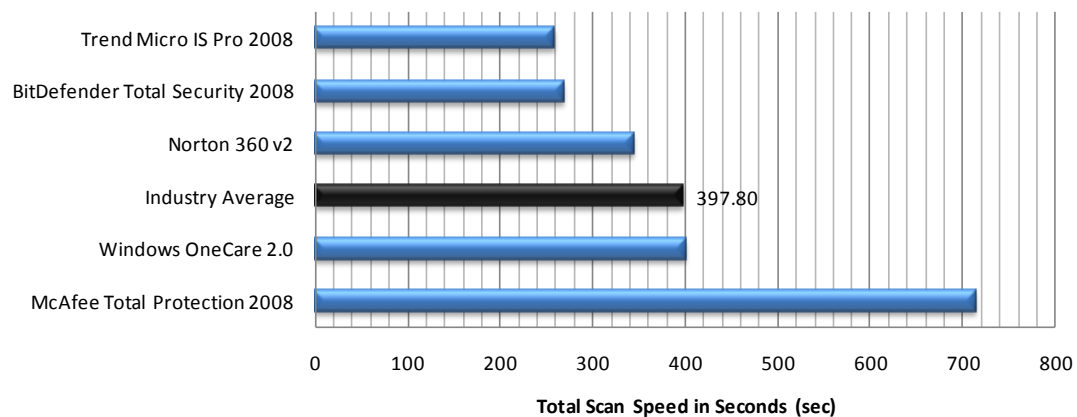
Benchmark 1 – Boot Time

The following chart compares the average system boot time (from a sample of 15 boots) for each Total Security product we tested. Products with lower boot times are considered better performing products in this category.



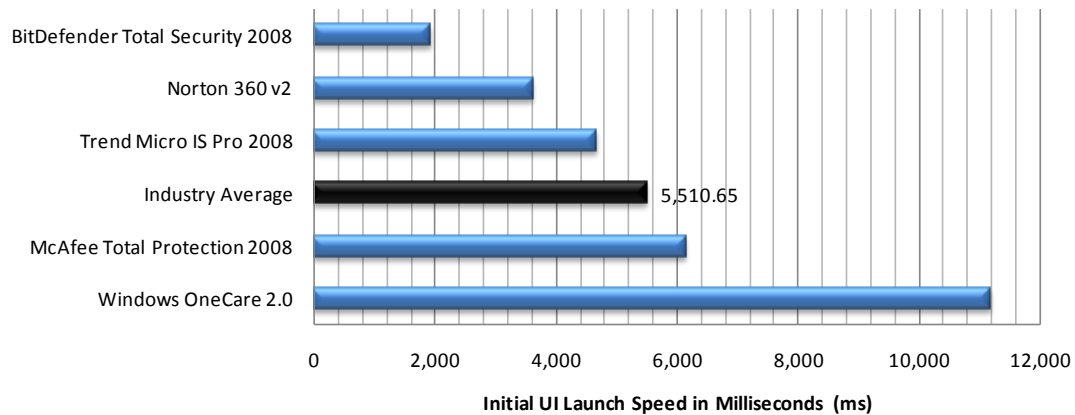
Benchmark 2 – Scan Speed

The following chart compares the average scan time of 6159 files (totaling 982MB) for each Total Security product we tested. This time is calculated by averaging the initial (Run 1) and subsequent (Runs 2-5) scan times. Products with lower scan times are considered better performing products in this category.



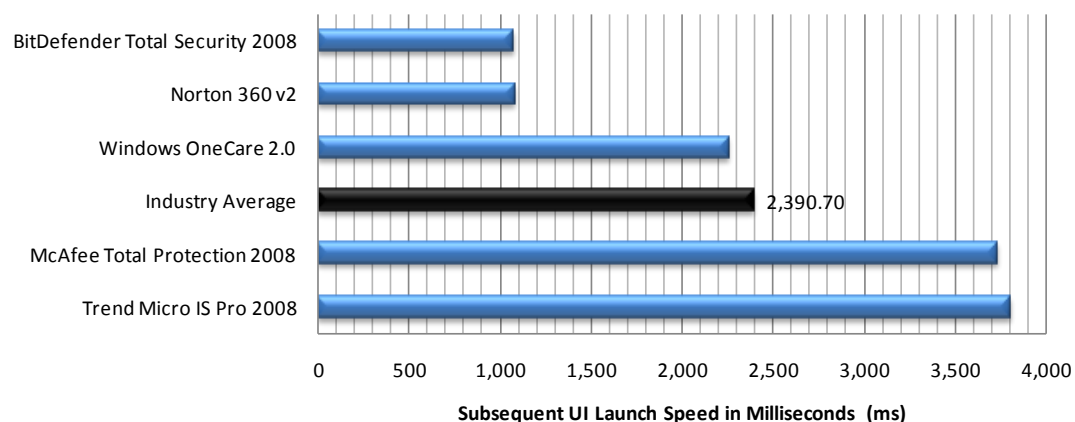
Benchmark 3a – Initial UI Launch Time

The following chart compares the average launch times of the User Interface (after rebooting the machine) for each Total Security product we tested. Products with lower UI launch times are considered better performing products in this category.



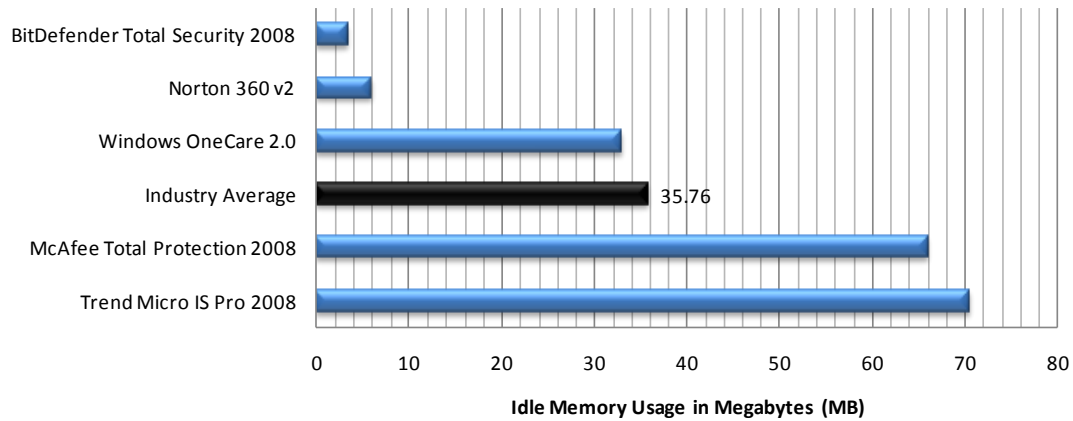
Benchmark 3b – Subsequent UI Launch Time

The following chart compares the average launch times of the User Interface by restarting the Total Security application (without rebooting the machine) for each Total Security product tested. Lower times are better. Products with lower UI launch times are considered better performing products in this category.



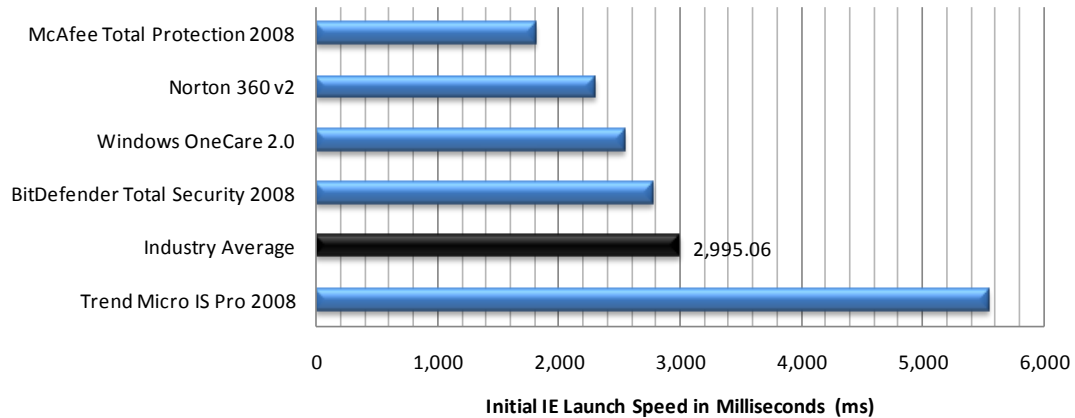
Benchmark 4 – Memory Utilization

The following chart compares the average amount of RAM used while idle for each Total Security product tested. This average is taken from a sample of ten memory snapshots taken at roughly 60 seconds apart after reboot. Products with lower idle RAM usage are considered better performing products in this category.



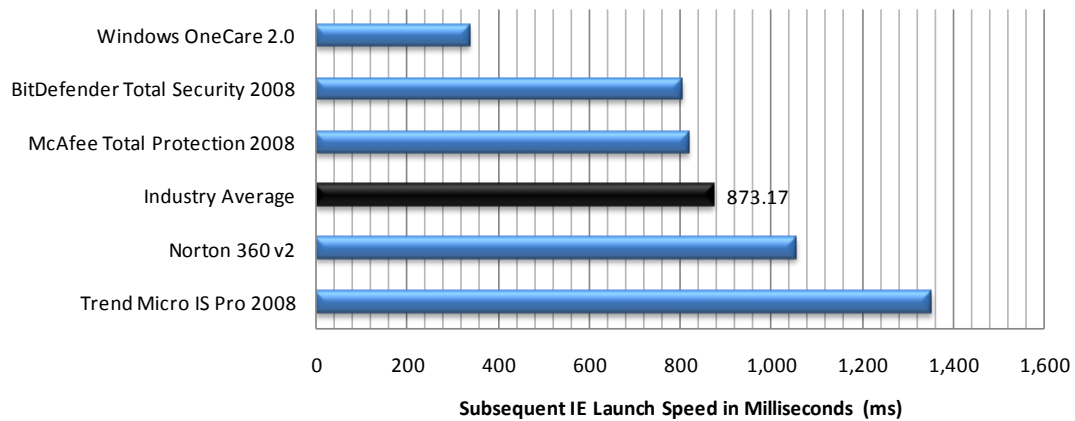
Benchmark 5a – Initial IE Launch Time

The following chart compares the average launch times of Internet Explorer after rebooting the machine for each Total Security product we tested. Products with lower IE launch times are considered better performing products in this category.



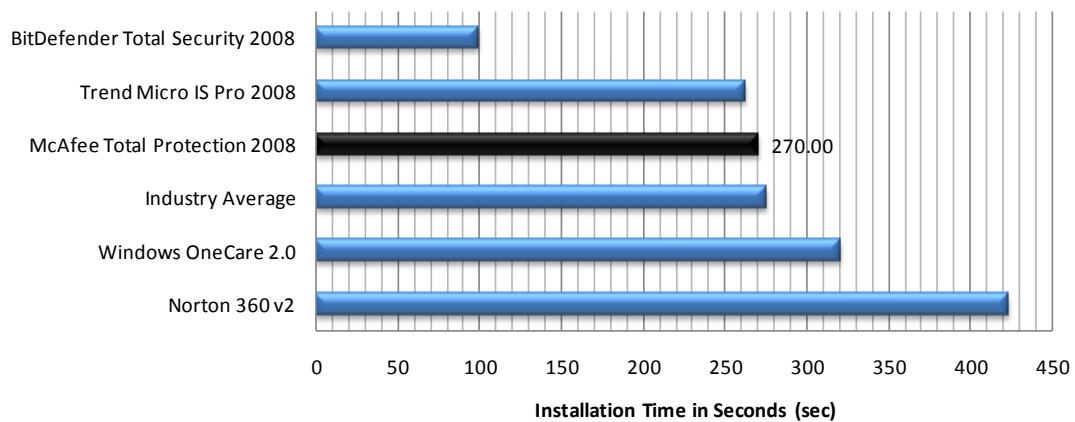
Benchmark 5b – Subsequent IE Launch Time

The following chart compares the average launch times of Internet Explorer after application restart (without rebooting the machine) for each Total Security product we tested. Products with lower IE launch times are considered better performing products in this category.



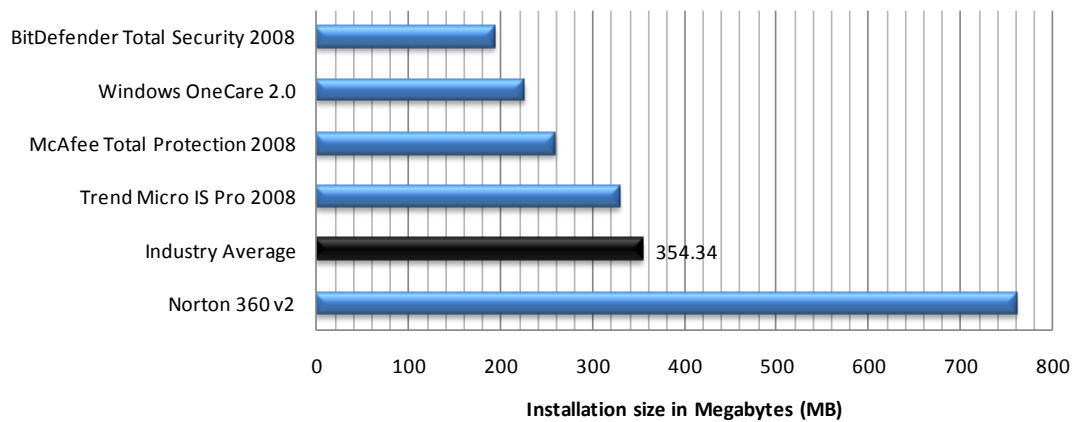
Benchmark 6 – Installation Time

The following chart compares the minimum installation time it takes for Total Security products to be fully functional and ready for use by the end user. Products with lower installation times are considered better performing products in this category.



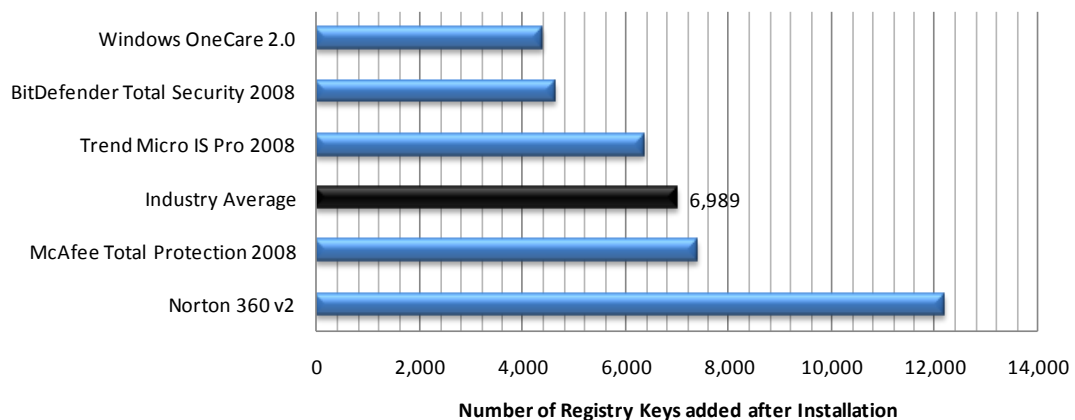
Benchmark 7 – Installation Size

The following chart compares the installation sizes of Total Security products. Products with lower installation sizes are considered better performing products in this category.



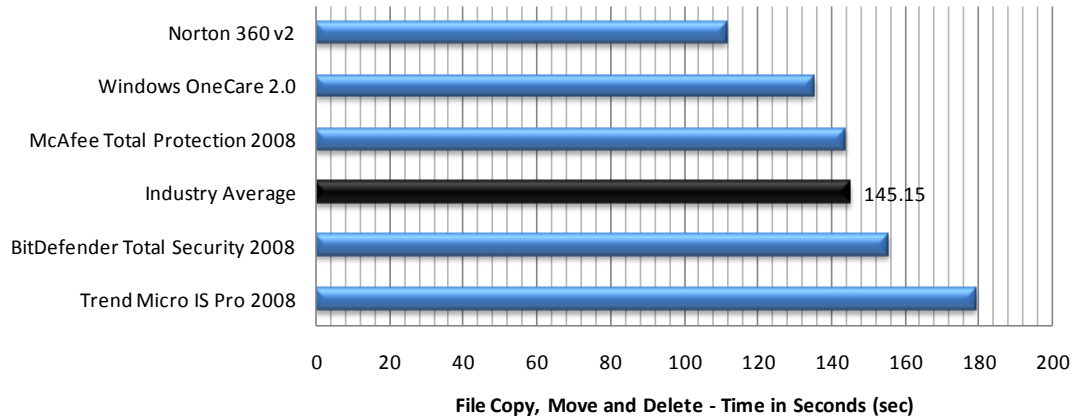
Benchmark 8 – Registry Key Count

The following chart compares the amount of Registry Keys created during product installation, for each Total Security product we tested. Products with lower key counts are considered better performing products in this category.



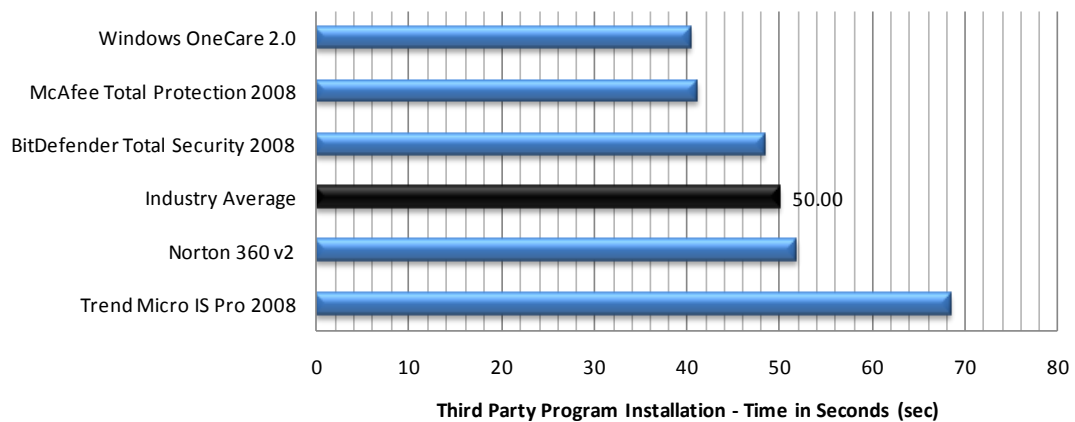
Benchmark 9 – File Copy, Move and Delete

The following chart compares the average speed of file copying, moving and deleting for each Total Security product we tested. Products with lower times are considered better performing products in this category.



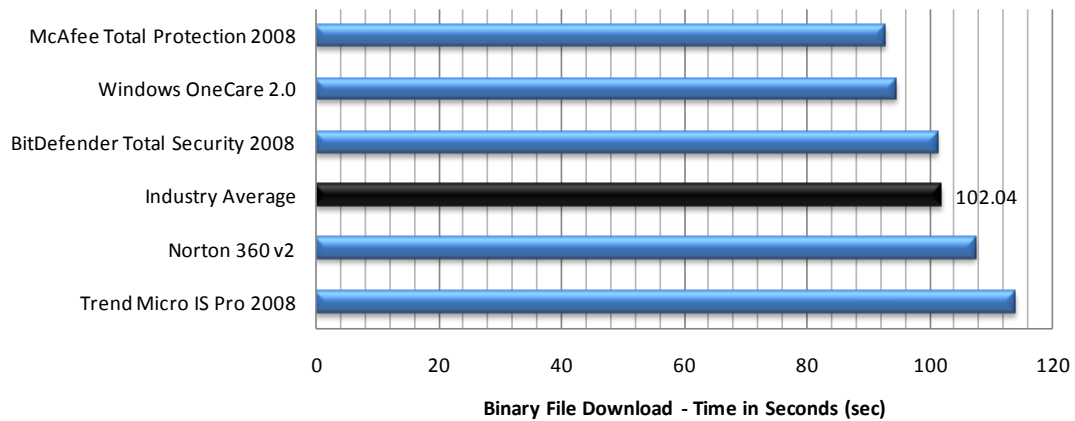
Benchmark 10 – Installation of Third Party Applications

The following chart compares the average speed of installation of third party applications for each Total Security product we tested. Products with lower times are considered better performing products in this category.



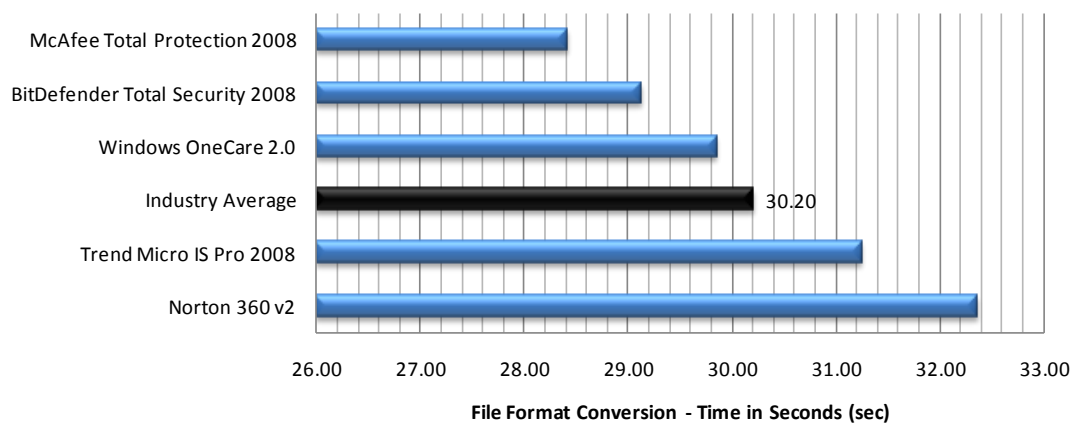
Benchmark 11 – Binary File Download Speed

The following chart compares the average speed of HTTP downloads of common file types for each Total Security product we tested. Products with lower times are considered better performing products in this category.



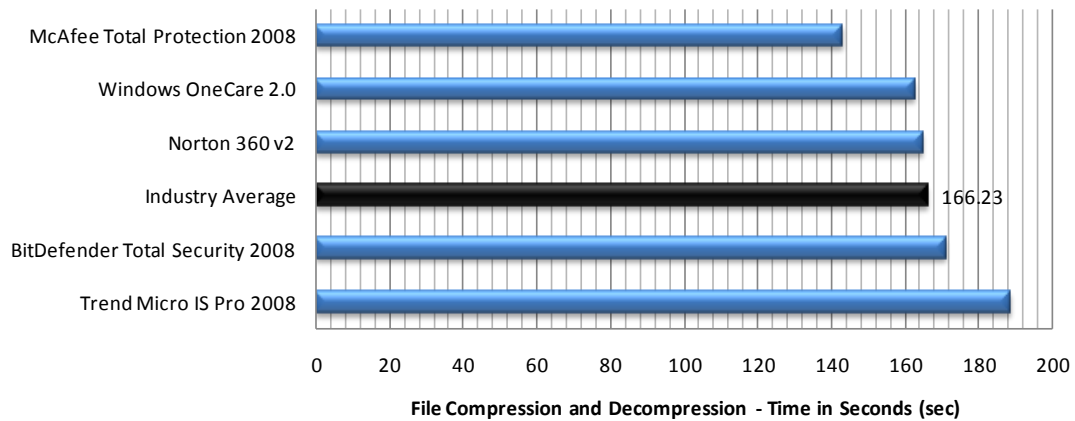
Benchmark 12 – File Format Conversion

The following chart compares the average speed at which files can be converted from one file format to another (MP3 ↔ WMA, MP3 ↔ WAV) for each Total Security product we tested. Products with lower times are considered better performing products in this category.



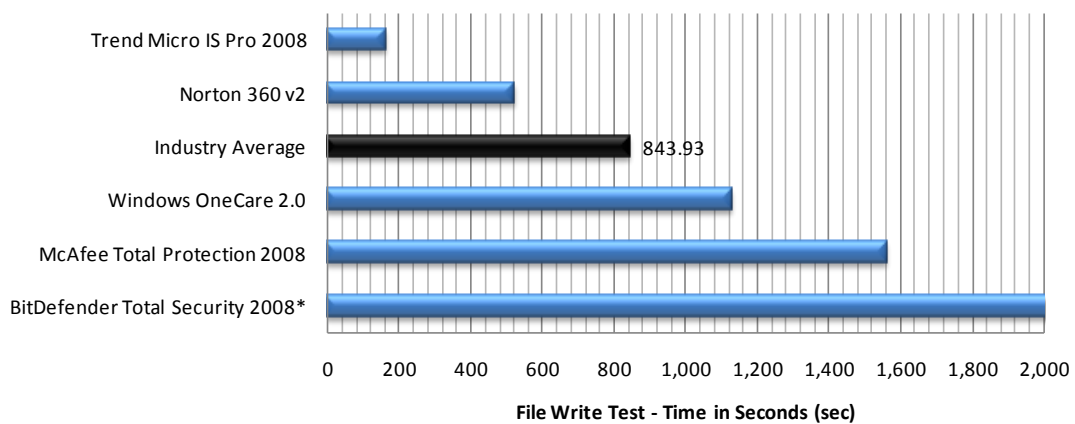
Benchmark 13 – File Compression and Decompression

The following chart compares the average speed at which files can be compressed and decompressed for each Total Security product we tested. Products with lower times are considered better performing products in this category.



Benchmark 14 – File Write, Open and Close

The following chart compares the average speed at which a file can be written to the hard drive, then opened and closed, for each Total Security product we tested. Products with lower times are considered better performing products in this category.



* **BitDefender Total Security 2008** performed relatively poorly in this category when compared to other products (over 4,200 seconds on average to execute the test). While this result has been included in the average, the chart has been rescaled to emphasize the differences between the remaining products.

What this report doesn't cover

This report focused on performance measurements such as execution speed and resource usage. No attempt was made to measure the effectiveness of threat detection, as this aspect of the products is covered by other industry benchmarks such as *Virus Bulletin* (<http://www.virusbtn.com>) and *AV Comparatives* (<http://www.av-comparatives.org>).

The metrics used for this report cover a number of key performance areas and are metrics that can be replicated and reproduced by third parties, if required.

However there are a number of areas that this report doesn't attempt to cover. These areas include:

- CPU usage during local file scanning.
- Impact on multitasking foreground tasks while scanning is in progress in the background.
- RAM usage during scanning.
- Impact on shutdown and hibernation times.
- The time a product takes to uninstall.
- "Out-of-the-box" virus signature update times.
- Impact on e-mail receiving and sending times.
- Speed of the products UI when performing common tasks.
- Impact on system stability.
- Testing on 64-bit operating systems with 64-bit hardware.

Some of these items are subjective and/or not easily measured, others such as signature update times are likely to change from one week to the next.

It might be of interest to revisit this list during any future tests with a view to adding additional metrics.

Disclaimer & Disclosure

This report only covers versions of products that were available as at 5 September 2008. The products we have tested are not an exhaustive list of all products available in these very competitive product categories.

Disclaimer of Liability

While every effort has been made to ensure that the information presented in this report is accurate, PassMark Software Pty Ltd assumes no responsibility for errors, omissions, or out-of-date information and shall not be liable in any manner whatsoever for direct, indirect, incidental, consequential, or punitive damages resulting from the availability of, use of, access of, or inability to use this information.

Disclosure

Symantec Corporation funded the production of this report and supplied some of the test scripts used for the tests (See *Appendix 1 – Test method – How did we conduct these tests?* below).

Trademarks

All trademarks are the property of their respective owners.

Contact details & more information

PassMark Software Pty Ltd
Suite 202, Level 2
35 Buckingham St.
Surry Hills, 2010
Sydney, Australia

Phone + 61 2 9690 0444
Fax + 61 2 9690 0445
Web www.passmark.com

Download Link

An electronic copy of this report can be found at the following location:
http://www.passmark.com/ftp/antivirus_09-performance-testing-ed1.pdf

Appendix 1 – Test method – How did we conduct these tests?

Common methodology

Norton Ghost was used to create images of the O/S and these clean images were restored before the test of each product.

Image creation steps

1. Install and activate Windows.
2. Download and install Windows Updates.
3. Disable Automatic Updates.
4. Turn off Windows security notifications.
5. Disable Windows Defender automatic scans to avoid unexpected background activity.
6. Close and disable "start at run" on the Vista sidebar to avoid some background activity.
7. Disable the Windows firewall.
8. Install Ghost.
9. Disable ghost taskbar icon from auto startup in msconfig.
10. Disable windows defender from startup in msconfig.
11. Optimize booting with *ProcessIdleTasks* (repeated several times).
12. Disable Vista admin prompts to allow for better test automation.
13. Reboot and tell msconfig not to start again.
14. Create image using Norton Ghost.

Benchmark 1 – Boot Time

The machines were rebooted in a cyclic manner. Averages of 15 boot times were taken for each product on each machine. The start of the boot process was taken to be the end of the BIOS initialization and the end of the boot process was taken to be when the CPU was idle for five continuous seconds.

Windows has various functions to optimize the boot process. Therefore, it is important to force optimization of the system before starting the test (with *ProcessIdleTasks*) and delete the Windows pre-fetch folder.

Benchmark 2 – Total Scan Speed

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 982MB. Most of these files come from the Windows system folders. As the file types can influence the scan speed, the breakdown of the main file types, file numbers and total sizes of the files in the sample set is given here.

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

For each product, five samples were taken with the machine rebooted before each sample to clear any caching effects. Our result is an average of these five samples.

Where possible, *PerfScan++* was used to automate the testing process. Additionally, if possible, the scan was run without launching the product's UI. Where it was not possible to use *PerfScan* or the product's in-built scan speed timer, the samples were taken manually with a stopwatch.

For some of these products, we noticed a substantial difference between the initial scan speed and subsequent scan speed, due to residual 'caching' effects. We executed an additional Initial Scan Speed test on the Vista machine for the Internet Security products that exhibited this behavior. These products were Norton Internet Security beta 116, Kaspersky Internet Security 2009 and ESET Smart Security.

The Initial Speed test comprised of three to five samples taken after re-imaging to a clean disk and newly installing each product (including a reboot). The average of these Initial Scan Speed samples is taken as the initial scan result (i.e. Scan 1) and averaged with four subsequent scan times to obtain the average Total Scan Speed result.

Benchmark 3 – UI Launch Speed

The launch speed of the product's user interface was tested using *AppTimer*. Each product was tested for five sets of three launches, with a reboot before each set. When compiling the results the first of each set was separated out so that there was a set of values for the initial launch after reboot and a set for subsequent launches.

In some cases, *AppTimer* did not correctly record the time taken for UI launch. For instance, some applications would open their window and look like they were ready, but then continued to be unresponsive. Where this was noticeable the measurement was taken manually with a stopwatch.

Benchmark 4 – Memory Utilization

The *Perflog++* utility was used to record process memory usage on the system at boot, and then every minute for another fifteen minutes after. This was done only once per product and resulted in a total of 15 samples. However the first sample taken at boot was never counted.

Because this recorded the memory usage of all processes, the products processes needed to be identified before the results could be processed. For this a program called *Sysinternals Process Explorer* was used to create a more detailed record of all the processes, with information such as company name included. This was run immediately after *Perflog* finished.

Benchmark 5 – IE Launch Speed

The launch speed of Internet Explorer interface was tested using *AppTimer*. This test was practically identical to the UI launch test. Each product was tested for 5 sets of 3 launches, with a reboot before each set. When compiling the results the first of each set was separated out so that there was a set of values for the initial launch after reboot and a set for subsequent launches.

Benchmark 6 – Installation Time

This test measures the minimum Installation Time a product requires to be fully functional and ready for use by the end user. Installation time can usually be divided in three major phases:

- The **Extraction and Setup** phase (green) consists of file extraction, the EULA prompt, product activation and user configurable options for installation.
- The **File Copy** phase (yellow) occurs when the product is being installed; usually this phase is indicated by a progress bar.
- The **Post-Installation phase** (tan) is any part of the installation that occurs after the File Copy phase. This phase varies widely between products; the time recorded in this phase may include a required reboot to finalize the installation or include the time the program takes to become idle in the system tray.

To reduce the impact of disk drive variables, each product was copied to the Desktop before initializing installation. Each step of the installation process was manually timed with a stopwatch and recorded in as much detail as possible. Where input was required by the end user, the stopwatch was paused and the input noted in the raw results in parenthesis after the phase description.

Where possible, all requests by products to pre-scan or post-install scan were declined or skipped. Where it was not possible to skip a scan, the time to scan was included as part of the installation time. Where an optional component of the installation formed a reasonable part of the functionality of the software, it was also installed (e.g. website link checking software as part of an IS).

Benchmark 7 – Installation Size

The installation size is defined as the difference between the snapshot of the Disk Space (C: drive) before and after the product is installed on the system.

After copying the installation package to Desktop, a screen capture (Alt + Print Scrn) of the C: drive properties showing the amount of Used Space was taken and saved to another drive. A second screen capture was taken of the C: drive showing the amount of Used Space immediately after a post-installation reboot. To obtain the installation size, we calculated the difference between the Used Space totals shown in the two snapshots.

Benchmark 8 – Registry Key Count

This test measures the amount of keys and values added to registry, after rebooting the test machine following a successful product installation. The test was conducted using *RegistryCounter.exe*, an application which conducts a count of all keys, errors and values under HKEY_LOCAL_MACHINE and HKEY_USERS.

Two Registry Key counts are taken, one prior to installation and a second immediately following a reboot after installation. To obtain our result, we calculated the difference between the two registry key totals

Benchmarks 9-14 – Real-Time Performance

We used a single script in testing Benchmarks 10-15. The script first defragments the disk volume (where defragmentation is higher than 15%) and then consecutively executes tests for Benchmarks 10-15. The script times each phase in these benchmarks using *CommandTimer.exe* and appends results to a log file.

Benchmarks 9 – 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 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	Category	Number	Size (bytes)
DOC	Documents	8	30,450,176
DOCX	Documents	4	13,522,409
PPT	Documents	3	5,769,216
PPTX	Documents	3	4,146,421
XLS	Documents	4	2,660,352
XLSX	Documents	4	1,426,054
PDF	Documents	73	136,298,049
ZIP	Documents	4	6,295,987
7Z	Documents	1	92,238
JPG	Media	351	31,375,259
GIF	Media	6	148,182
MOV	Media	7	57,360,371
RM	Media	1	5,658,646
AVI	Media	8	78,703,408
WMV	Media	5	46,126,167
MP3	Media	28	191,580,387
EXE	PE	19	2,952,914
DLL	PE	104	29,261,568
AX	PE	1	18,432
CPL	PE	2	2,109,440
CPX	PE	2	4,384
DRV	PE	10	154,864
ICO	PE	1	107,620
MSC	PE	1	41,587
NT	PE	1	1,688
ROM	PE	2	36,611
SCR	PE	2	2,250,240
SYS	PE	1	37,528,093
TLB	PE	3	135,580
TSK	PE	1	1,152

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

This test was conducted three to 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 10 – 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 Microsoft .NET Framework 2.0 (*.msi) application on the test machine.

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

Benchmark 11 – Binary File Download Speed

This benchmark measured how much time was required to download a sample set of binary files of various sizes and types over an isolated segment of the network. The files were hosted on a server machine running Windows Server 2008 and IIS7. *CommandTimer.exe* was used in conjunction with *GNU Wget* to time and conduct the download test.

The complete sample set of files was made up of 553,638,694 bytes over 484 files and two file type categories: media files [74% of total] and documents [26% of total]. 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 format	Category	Number	Size (bytes)
JPEG	Media	343	30,668,312
GIF	Media	9	360,349
PNG	Media	5	494,780
MOV	Media	7	57,360,371
RM	Media	1	5,658,646
AVI	Media	8	78,703,408
WMV	Media	5	46,126,167
MP3	Media	28	191,580,387
PDF	Documents	73	136,298,049
ZIP	Documents	4	6,295,987
7Z	Documents	1	92,238
Total		484	553,638,694

This test was conducted three to five times to obtain the average time to download this sample of files, with the test machine rebooted between each sample to remove potential caching effects.

Benchmark 12 – File Format Conversion (MP3 → WAV, MP3 → WMA)

This test measured how much time was required to convert an MP3 into a WAV file and subsequently, convert the same MP3 sample into a WMA file. The sample MP3 used was 3,375,104 bytes in size.

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 three to 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 13 – 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 404 files over 277,346,661 bytes. 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 format	Category	Number	Size (bytes)
DOC	Documents	8	30,450,176
DOCX	Documents	4	13,522,409
PPT	Documents	3	5,769,216
PPTX	Documents	3	4,146,421
XLS	Documents	4	2,660,352
XLSX	Documents	4	1,426,054
JPG	Media	351	31,375,259
GIF	Media	6	148,182
MOV	Media	7	57,360,371
RM	Media	1	5,658,646
AVI	Media	8	78,703,408
WMV	Media	5	46,126,167
Total		404	277,346,661

This test was conducted three to 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 14 – 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 #2: 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 three to 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.

Appendix 2 – Test Environment

IBM/Lenovo A55 ThinkCentre Desktop, Core2 6300, 1GB of RAM, 220GB Hard Disk Drive.
Vista Ultimate (32-bit).

(N.B. At the time of previous testing performed for Symantec, this machine was considered to be reasonably high end.)

Appendix 3a – Internet Security Raw Results

In the following tables, the column titled “Average” compares a product's performance to the industry average (marked in gray). Products with negative values have performed better than industry average, while products with positive values have performed worse than average. For example, the raw results from our Boot Time test indicate that Norton Internet Security 2009 has performed 20.51% better than the industry average in that category.

For ease of comparison, we have highlighted the results we obtained for Norton Internet Security 2009 in orange. Industry averages are highlighted in silver.

Boot Time

Product Name	Time (Sec)	Average
Panda Internet Security 2008	57.62	35.76%
AVG Internet Security 2008	48.16	13.48%
F-Secure Internet Security 2009 BETA	47.24	11.30%
G-Data Internet Security 2008	46.87	10.44%
Industry Average	42.44	0.00%
ESET Smart Security 2008	39.59	-6.71%
Kaspersky Internet Security 8	39.28	-7.44%
Trend Micro Internet Security 2008	39.22	-7.59%
McAfee Internet Security 2008	36.55	-13.88%
Norton Internet Security 2008	36.15	-14.84%
Norton Internet Security 2009	33.74	-20.51%

Scan Speed

Product Name	Time (Sec)	Average
AVG Internet Security 2008	355.80	128.89%
G-Data Internet Security 2008	261.20	68.04%
McAfee Internet Security 2008	206.11	32.60%
F-Secure Internet Security 2009 BETA	198.60	27.76%
Industry Average	155.44	0.00%
Trend Micro Internet Security 2008	141.60	-8.91%
Norton Internet Security 2008	118.29	-23.90%
ESET Smart Security 2008	94.90	-38.95%
Panda Internet Security 2008	78.00	-49.82%
Kaspersky Internet Security 8	67.33	-56.68%
Norton Internet Security 2009	32.60	-79.03%

Initial UI Launch Speed

Product Name	Time (ms)	Average
Trend Micro Internet Security 2008	4,632.00	184.45%
Panda Internet Security 2008	2,580.00	58.44%
F-Secure Internet Security 2009 BETA	2,427.88	49.10%
AVG Internet Security 2008	2,425.50	48.95%
G-Data Internet Security 2008	2,075.00	27.43%
Industry Average	1,628.39	0.00%
McAfee Internet Security 2008	677.88	-58.37%
Kaspersky Internet Security 8	612.40	-62.39%
Norton Internet Security 2008	549.60	-66.25%
Norton Internet Security 2009	253.68	-84.42%
ESET Smart Security 2008	50.00	-96.93%

Subsequent UI Launch Speed

Product Name	Time (ms)	Average
Trend Micro Internet Security 2008	3,691.25	214.09%
Panda Internet Security 2008	2,529.38	115.23%
F-Secure Internet Security 2009 BETA	1,690.34	43.83%
AVG Internet Security 2008	1,642.11	39.73%
Industry Average	1,175.21	0.00%
McAfee Internet Security 2008	584.86	-50.23%
Kaspersky Internet Security 8	556.59	-52.64%
G-Data Internet Security 2008	442.22	-62.37%
Norton Internet Security 2008	295.20	-74.88%
Norton Internet Security 2009	268.49	-77.15%
ESET Smart Security 2008	51.70	-95.60%

Memory Utilization

Product Name	RAM (MB)	Average
Panda Internet Security 2008	93.20	85.68%
G-Data Internet Security 2008	76.08	51.57%
McAfee Internet Security 2008	74.21	47.83%
F-Secure Internet Security 2009 BETA	68.39	36.25%
AVG Internet Security 2008	66.46	32.39%
Trend Micro Internet Security 2008	52.35	4.29%
Industry Average	50.20	0.00%
ESET Smart Security 2008	33.38	-33.50%
Kaspersky Internet Security 8	22.38	-55.42%
Norton Internet Security 2008	8.59	-82.88%
Norton Internet Security 2009	6.92	-86.21%

Initial IE Launch Speed

Product Name	Time (ms)	Average
Norton Internet Security 2008	1,957.80	105.99%
G-Data Internet Security 2008	1,726.75	81.68%
AVG Internet Security 2008	1,187.25	24.92%
Trend Micro Internet Security 2008	1,021.25	7.45%
Industry Average	950.43	0.00%
McAfee Internet Security 2008	877.86	-7.64%
Panda Internet Security 2008	754.00	-20.67%
Norton Internet Security 2009	598.08	-37.07%
Kaspersky Internet Security 8	594.25	-37.48%
ESET Smart Security 2008	433.00	-54.44%
F-Secure Internet Security 2009 BETA	354.04	-62.75%

Subsequent IE Launch Speed

Product Name	Time (ms)	Average
AVG Internet Security 2008	729.45	44.44%
Norton Internet Security 2008	609.80	20.75%
Panda Internet Security 2008	605.80	19.95%
McAfee Internet Security 2008	570.08	12.88%
Industry Average	505.03	0.00%
G-Data Internet Security 2008	503.00	-0.40%
Norton Internet Security 2009	496.63	-1.66%
Trend Micro Internet Security 2008	474.30	-6.08%
Kaspersky Internet Security 8	384.90	-23.79%
F-Secure Internet Security 2009 BETA	353.15	-30.07%
ESET Smart Security 2008	323.20	-36.00%

Installation Time

Product Name	Time (Sec)	Average
McAfee Internet Security 2008	456.53	126.00%
Trend Micro Internet Security 2008	270.86	34.09%
Norton Internet Security 2008	253.02	25.26%
F-Secure Internet Security 2009 BETA	248.37	22.95%
Panda Internet Security 2008	220.35	9.08%
G-Data Internet Security 2008	207.97	2.95%
Industry Average	202.00	0.00%
Kaspersky Internet Security 8	183.17	-9.32%
AVG Internet Security 2008	68.04	-66.32%
ESET Smart Security 2008	58.94	-70.82%
Norton Internet Security 2009	52.77	-73.88%

Installation Size

Product Name	Size (MB)	Average
Trend Micro Internet Security 2008	1,130.79	59.31%
Panda Internet Security 2008	893.60	25.89%
Norton Internet Security 2008	890.02	25.39%
McAfee Internet Security 2008	839.08	18.21%
AVG Internet Security 2008	800.11	12.72%
G-Data Internet Security 2008	741.92	4.52%
Industry Average	709.82	0.00%
F-Secure Internet Security 2009 BETA	689.54	-2.86%
Kaspersky Internet Security 8	612.44	-13.72%
ESET Smart Security 2008	358.28	-49.53%
Norton Internet Security 2009	142.46	-79.93%

Registry Key Count

Product Name	Keys	Average
Norton Internet Security 2008	10,886	123.07%
G-Data Internet Security 2008	6,525	33.71%
Kaspersky Internet Security 8	6,413	31.41%
McAfee Internet Security 2008	5,900	20.90%
Trend Micro Internet Security 2008	5,612	15.00%
Industry Average	4,880	0.00%
Panda Internet Security 2008	4,104	-15.90%
F-Secure Internet Security 2009 BETA	3,080	-36.89%
Norton Internet Security 2009	2,582	-47.09%
ESET Smart Security 2008	1,916	-60.74%
AVG Internet Security 2008	1,782	-63.48%

File Copy, Move and Delete

Product Name	Time (Sec)	Average
AVG Internet Security 2008	85.78	23.43%
G-Data Internet Security 2008	85.44	22.94%
Trend Micro Internet Security 2008	79.70	14.69%
F-Secure Internet Security 2009 BETA	77.22	11.12%
Norton Internet Security 2009	76.79	10.50%
Industry Average	69.49	0.00%
McAfee Internet Security 2008	67.48	-2.90%
Panda Internet Security 2008	64.16	-7.67%
Norton Internet Security 2008	58.60	-15.67%
ESET Smart Security 2008	50.09	-27.92%
Kaspersky Internet Security 8	49.68	-28.51%

Third Party Program Installation

Product Name	Time (Sec)	Average
Trend Micro Internet Security 2008	61.88	21.75%
G-Data Internet Security 2008	58.29	14.70%
F-Secure Internet Security 2009 BETA	54.67	7.58%
Norton Internet Security 2009	51.63	1.60%
McAfee Internet Security 2008	50.82	0.00%
Industry Average	50.33	-0.97%
Kaspersky Internet Security 8	49.38	-2.84%
ESET Smart Security 2008	46.30	-8.90%
Panda Internet Security 2008	45.63	-10.22%
Norton Internet Security 2008	43.24	-14.92%
AVG Internet Security 2008	41.45	-18.44%

Binary Download Speed

Product Name	Time (Sec)	Average
AVG Internet Security 2008	104.15	44.41%
F-Secure Internet Security 2009 BETA	91.00	26.17%
G-Data Internet Security 2008	74.17	2.85%
Industry Average	72.12	0.00%
Kaspersky Internet Security 8	70.42	-2.36%
Norton Internet Security 2008	68.76	-4.66%
Panda Internet Security 2008	67.13	-6.92%
ESET Smart Security 2008	62.96	-12.70%
Norton Internet Security 2009	62.54	-13.29%
McAfee Internet Security 2008	61.68	-14.48%
Trend Micro Internet Security 2008	58.42	-19.01%

File Format Conversion

Product Name	Time (Sec)	Average
Panda Internet Security 2008	17.46	3.33%
F-Secure Internet Security 2009 BETA	17.23	1.92%
Trend Micro Internet Security 2008	17.16	1.53%
G-Data Internet Security 2008	16.92	0.14%
Industry Average	16.90	0.00%
Kaspersky Internet Security 8	16.80	-0.58%
ESET Smart Security 2008	16.80	-0.62%
Norton Internet Security 2009	16.78	-0.69%
Norton Internet Security 2008	16.73	-1.01%
AVG Internet Security 2008	16.65	-1.46%
McAfee Internet Security 2008	16.47	-2.57%

File Compression and Decompression

Product Name	Time (Sec)	Average
ESET Smart Security 2008	46.57	18.08%
F-Secure Internet Security 2009 BETA	44.68	13.28%
Trend Micro Internet Security 2008	42.81	8.54%
G-Data Internet Security 2008	41.62	5.53%
Norton Internet Security 2008	40.15	1.80%
Industry Average	39.44	0.00%
Panda Internet Security 2008	37.65	-4.53%
McAfee Internet Security 2008	36.01	-8.69%
Kaspersky Internet Security 8	35.92	-8.91%
AVG Internet Security 2008	35.52	-9.94%
Norton Internet Security 2009	33.46	-15.16%

File Write, Open and Close

Product Name	Time (Sec)	Average
F-Secure Internet Security 2009 BETA	3,496.33	1908.20%
McAfee Internet Security 2008	874.98	402.57%
Norton Internet Security 2008	266.18	52.89%
Industry Average	174.10	0.00%
ESET Smart Security 2008	90.79	-47.85%
Kaspersky Internet Security 8	88.46	-49.19%
Trend Micro Internet Security 2008	82.07	-52.86%
Norton Internet Security 2009	51.74	-70.28%
Panda Internet Security 2008	49.29	-71.69%
G-Data Internet Security 2008	32.90	-81.10%
AVG Internet Security 2008	30.51	-82.48%

Appendix 3b – Antivirus Raw Results

In the following tables, the column titled “Average” compares a product's performance to the industry average (marked in gray). Products with negative values have performed better than industry average, while products with positive values have performed worse than average. For example, the raw results from our Boot Time test indicate that Norton Antivirus 2009 has performed 14.07% better than the industry average in that category.

For ease of comparison, we have highlighted the results we obtained for Norton Antivirus 2009 in orange. Industry averages are highlighted in silver.

Boot Time

Product Name	Time (Sec)	Average
McAfee VirusScanPlus 2008	46.34	16.03%
Rising Security Antivirus	46.06	15.31%
AVG Free AV&AS 2008	45.51	13.94%
G-Data Antivirus 2008	43.02	7.71%
SourceNext Virus Security ZERO 2008	41.57	4.09%
Avira AntiVir Free AV 8	41.13	2.99%
Industry Average	39.94	0.00%
Trend Micro Antivirus 2008	38.25	-4.24%
Kaspersky Antivirus 8	37.98	-4.92%
Avast! Antivirus 4.8	35.97	-9.95%
Norton Antivirus 2008	35.75	-10.50%
Norton Antivirus 2009	34.32	-14.07%
ESET NOD32 Antivirus 3.0	33.39	-16.40%

Scan Speed

Product Name	Time (Sec)	Average
AVG Free AV&AS 2008	364.20	166.10%
G-Data Antivirus 2008	255.40	86.61%
McAfee VirusScanPlus 2008	227.80	66.44%
Rising Security Antivirus	152.40	11.35%
Industry Average	136.87	0.00%
Trend Micro Antivirus 2008	123.20	-9.98%
Avast! Antivirus 4.8	116.87	-14.61%
Norton Antivirus 2008	108.34	-20.85%
ESET NOD32 Antivirus 3.0	86.80	-36.58%
Avira AntiVir Free AV 8	68.80	-49.73%
Kaspersky Antivirus 8	57.60	-57.91%
SourceNext Virus Security ZERO 2008	48.79	-64.35%
Norton Antivirus 2009	32.20	-76.47%

Initial UI Launch Speed

AntiVirus Products		
Product Name	Time (ms)	Average
Trend Micro Antivirus 2008	4,015.00	209.89%
McAfee VirusScanPlus 2008	3,522.50	171.88%
Avira AntiVir Free AV 8	2,509.20	93.67%
AVG Free AV&AS 2008	1,659.98	28.12%
Industry Average	1,295.61	0.00%
G-Data Antivirus 2008	980.00	-24.36%
Avast! Antivirus 4.8	803.10	-38.01%
Kaspersky Antivirus 8	565.40	-56.36%
SourceNext Virus Security ZERO 2008	543.60	-58.04%
Norton Antivirus 2008	390.20	-69.88%
Rising Security Antivirus	343.70	-73.47%
Norton Antivirus 2009	167.70	-87.06%
ESET NOD32 Antivirus 3.0	47.00	-96.37%

Subsequent UI Launch Speed

Product Name	Time (ms)	Average
Trend Micro Antivirus 2008	3,666.00	224.36%
McAfee VirusScanPlus 2008	2,575.00	127.83%
Avira AntiVir Free AV 8	2,452.70	117.01%
AVG Free AV&AS 2008	1,614.01	42.80%
Industry Average	1,130.22	0.00%
G-Data Antivirus 2008	825.63	-26.95%
Avast! Antivirus 4.8	743.56	-34.21%
Kaspersky Antivirus 8	523.78	-53.66%
SourceNext Virus Security ZERO 2008	348.23	-69.19%
Norton Antivirus 2008	281.20	-75.12%
Rising Security Antivirus	268.49	-76.24%
Norton Antivirus 2009	217.11	-80.79%
ESET NOD32 Antivirus 3.0	47.00	-95.84%

Memory Utilization

Product Name	RAM (MB)	Average
G-Data Antivirus 2008	57.79	99.77%
AVG Free AV&AS 2008	56.06	93.77%
McAfee VirusScanPlus 2008	45.54	57.42%
ESET NOD32 Antivirus 3.0	32.95	13.90%
SourceNext Virus Security ZERO 2008	30.85	6.62%
Trend Micro Antivirus 2008	30.65	5.94%
Industry Average	28.93	0.00%
Avira AntiVir Free AV 8	22.30	-22.92%
Kaspersky Antivirus 8	20.34	-29.68%
Rising Security Antivirus	19.23	-33.54%
Avast! Antivirus 4.8	18.05	-37.61%
Norton Antivirus 2008	8.02	-72.26%
Norton Antivirus 2009	5.38	-81.41%

Initial IE Launch Speed

Product Name	Time (ms)	Average
AVG Free AV&AS 2008	1,352.86	62.46%
Rising Security Antivirus	1,311.43	57.49%
G-Data Antivirus 2008	1,182.00	41.94%
McAfee VirusScanPlus 2008	1,043.58	25.32%
SourceNext Virus Security ZERO 2008	928.00	11.44%
Industry Average	832.73	0.00%
Trend Micro Antivirus 2008	765.50	-8.07%
Norton Antivirus 2008	726.40	-12.77%
Avast! Antivirus 4.8	707.75	-15.01%
Kaspersky Antivirus 8	559.60	-32.80%
Norton Antivirus 2009	494.04	-40.67%
Avira AntiVir Free AV 8	464.80	-44.18%
ESET NOD32 Antivirus 3.0	456.80	-45.14%

Subsequent IE Launch Speed

Product Name	Time (ms)	Average
AVG Free AV&AS 2008	1,024.66	130.16%
McAfee VirusScanPlus 2008	564.77	26.86%
Trend Micro Antivirus 2008	459.30	3.17%
Industry Average	445.20	0.00%
G-Data Antivirus 2008	421.90	-5.23%
SourceNext Virus Security ZERO 2008	420.11	-5.63%
Norton Antivirus 2009	403.73	-9.31%
Norton Antivirus 2008	393.20	-11.68%
Kaspersky Antivirus 8	367.60	-17.43%
Avast! Antivirus 4.8	335.71	-24.59%
ESET NOD32 Antivirus 3.0	330.30	-25.81%
Rising Security Antivirus	316.97	-28.80%
Avira AntiVir Free AV 8	304.10	-31.69%

Installation Time

Product Name	Time (Sec)	Average
McAfee VirusScanPlus 2008	354.20	167.62%
Norton Antivirus 2008	245.52	85.50%
G-Data Antivirus 2008	171.06	29.24%
Kaspersky Antivirus 8	159.82	20.75%
Rising Security Antivirus	140.58	6.22%
Industry Average	132.35	0.00%
SourceNext Virus Security ZERO 2008	121.28	-8.37%
Avast! Antivirus 4.8	101.17	-23.56%
Trend Micro Antivirus 2008	84.66	-36.03%
AVG Free AV&AS 2008	64.97	-50.91%
ESET NOD32 Antivirus 3.0	56.91	-57.00%
Norton Antivirus 2009	47.27	-64.28%
Avira AntiVir Free AV 8	40.80	-69.17%

Installation Size

Product Name	Size (MB)	Average
Norton Antivirus 2008	778.45	131.63%
Trend Micro Antivirus 2008	666.19	98.23%
Kaspersky Antivirus 8	494.55	47.16%
AVG Free AV&AS 2008	373.02	11.00%
G-Data Antivirus 2008	365.21	8.67%
ESET NOD32 Antivirus 3.0	361.14	7.46%
Avira AntiVir Free AV 8	356.34	6.03%
Industry Average	336.07	0.00%
McAfee VirusScanPlus 2008	197.65	-41.19%
Rising Security Antivirus	163.84	-51.25%
SourceNext Virus Security ZERO 2008	156.15	-53.54%
Avast! Antivirus 4.8	70.55	-79.01%
Norton Antivirus 2009	49.71	-85.21%

Registry Key Count

Product Name	Time (Sec)	Average
Norton Antivirus 2008	9,090	192.83%
Kaspersky Antivirus 8	6,010	93.61%
McAfee VirusScanPlus 2008	5,219	68.13%
G-Data Antivirus 2008	5,095	64.13%
Industry Average	3,104	0.00%
Norton Antivirus 2009	2,724	-12.25%
Trend Micro Antivirus 2008	2,490	-19.79%
SourceNext Virus Security ZERO 2008	2,035	-34.44%
AVG Free AV&AS 2008	1,719	-44.62%
ESET NOD32 Antivirus 3.0	994	-67.98%
Avast! Antivirus 4.8	884	-71.52%
Rising Security Antivirus	801	-74.20%
Avira AntiVir Free AV 8	189	-93.91%

File Copy, Move and Delete

Product Name	Time (Sec)	Average
G-Data Antivirus 2008	84.12	23.22%
AVG Free AV&AS 2008	79.24	16.07%
Norton Antivirus 2009	77.43	13.42%
McAfee VirusScanPlus 2008	73.41	7.53%
Norton Antivirus 2008	73.35	7.44%
SourceNext Virus Security ZERO 2008	68.69	0.61%
Industry Average	68.27	0.00%
Trend Micro Antivirus 2008	67.71	-0.82%
Rising Security Antivirus	65.17	-4.53%
Avira AntiVir Free AV 8	63.83	-6.49%
Avast! Antivirus 4.8	63.55	-6.91%
Kaspersky Antivirus 8	51.81	-24.12%
ESET NOD32 Antivirus 3.0	50.91	-25.42%

Third Party Program Installation

Product Name	Time (Sec)	Average
Trend Micro Antivirus 2008	68.32	34.11%
SourceNext Virus Security ZERO 2008	64.15	25.93%
G-Data Antivirus 2008	60.75	19.25%
Kaspersky Antivirus 8	52.30	2.67%
Industry Average	50.94	0.00%
McAfee VirusScanPlus 2008	49.62	-2.60%
Avast! Antivirus 4.8	48.84	-4.13%
Norton Antivirus 2009	47.50	-6.76%
AVG Free AV&AS 2008	47.22	-7.31%
ESET NOD32 Antivirus 3.0	45.18	-11.30%
Norton Antivirus 2008	44.46	-12.72%
Rising Security Antivirus	42.24	-17.09%
Avira AntiVir Free AV 8	40.73	-20.06%

Binary Download Speed

Product Name	Time (Sec)	Average
Kaspersky Antivirus 8	71.58	14.73%
Norton Antivirus 2008	68.27	9.43%
G-Data Antivirus 2008	66.79	7.06%
McAfee VirusScanPlus 2008	65.41	4.85%
Norton Antivirus 2009	64.04	2.65%
Industry Average	62.39	0.00%
Avira AntiVir Free AV 8	60.11	-3.65%
Trend Micro Antivirus 2008	59.61	-4.46%
SourceNext Virus Security ZERO 2008	59.37	-4.83%
Rising Security Antivirus	59.05	-5.35%
Avast! Antivirus 4.8	58.59	-6.08%
ESET NOD32 Antivirus 3.0	58.52	-6.20%
AVG Free AV&AS 2008	57.29	-8.16%

File Format Conversion

Product Name	Time (Sec)	Average
Norton Antivirus 2008	18.51	6.75%
Kaspersky Antivirus 8	18.11	4.47%
G-Data Antivirus 2008	17.64	1.77%
Trend Micro Antivirus 2008	17.51	0.98%
Rising Security Antivirus	17.40	0.36%
Avast! Antivirus 4.8	17.34	0.01%
Industry Average	17.34	0.00%
SourceNext Virus Security ZERO 2008	17.19	-0.83%
ESET NOD32 Antivirus 3.0	17.07	-1.55%
Avira AntiVir Free AV 8	17.04	-1.69%
Norton Antivirus 2009	16.77	-3.26%
AVG Free AV&AS 2008	16.76	-3.32%
McAfee VirusScanPlus 2008	16.69	-3.70%

File Compression and Decompression

Product Name	Time (Sec)	Average
Avira AntiVir Free AV 8	47.76	21.15%
Avast! Antivirus 4.8	46.14	17.04%
ESET NOD32 Antivirus 3.0	41.98	6.49%
Trend Micro Antivirus 2008	40.66	3.14%
SourceNext Virus Security ZERO 2008	40.41	2.51%
Industry Average	39.42	0.00%
Rising Security Antivirus	38.91	-1.30%
G-Data Antivirus 2008	38.58	-2.15%
McAfee VirusScanPlus 2008	37.38	-5.19%
Norton Antivirus 2008	35.97	-8.75%
Norton Antivirus 2009	35.83	-9.12%
Kaspersky Antivirus 8	34.99	-11.23%
AVG Free AV&AS 2008	34.46	-12.60%

File Write, Open and Close

Product Name	Time (Sec)	Average
SourceNext Virus Security ZERO 2008	1,334.50	410.52%
McAfee VirusScanPlus 2008	874.66	234.60%
Norton Antivirus 2008	286.56	9.62%
Industry Average	261.40	0.00%
Rising Security Antivirus	154.07	-41.06%
ESET NOD32 Antivirus 3.0	102.17	-60.91%
Kaspersky Antivirus 8	84.52	-67.67%
Trend Micro Antivirus 2008	84.46	-67.69%
Avast! Antivirus 4.8	63.64	-75.66%
Norton Antivirus 2009	50.33	-80.75%
Avira AntiVir Free AV 8	36.18	-86.16%
G-Data Antivirus 2008	34.62	-86.75%
AVG Free AV&AS 2008	31.13	-88.09%

Appendix 3c – Total Security Raw Results

In the following tables, the column titled “Average” compares a product's performance to the industry average (marked in gray). Products with negative values have performed better than industry average, while products with positive values have performed worse than average. For example, the following Boot Time table shows that Windows OneCare has performed 46.68% worse than the Industry Average.

For ease of comparison, industry averages are highlighted in silver.

Boot Time

Product Name	Time (Sec)	Average
Windows OneCare 2.0	195.55	46.68%
Industry Average	133.32	0.00%
Trend Micro IS Pro 2008	123.21	-7.58%
Norton 360 v2	119.26	-10.55%
BitDefender Total Security 2008	114.34	-14.23%
McAfee Total Protection 2008	114.23	-14.32%

Scan Speed

Product Name	Time (Sec)	Average
McAfee Total Protection 2008	714.60	79.64%
Windows OneCare 2.0	401.40	0.90%
Industry Average	397.80	0.00%
Norton 360 v2	344.80	-13.32%
BitDefender Total Security 2008	269.40	-32.28%
Trend Micro IS Pro 2008	258.80	-34.94%

Initial UI Launch Speed

Product Name	Time (ms)	Average
Windows OneCare 2.0	11,178.00	102.84%
McAfee Total Protection 2008	6,147.50	11.56%
Industry Average	5,510.65	0.00%
Trend Micro IS Pro 2008	4,682.00	-15.04%
Norton 360 v2	3,630.00	-34.13%
BitDefender Total Security 2008	1,915.75	-65.24%

Subsequent UI Launch Speed

Product Name	Time (ms)	Average
Trend Micro IS Pro 2008	3,809.00	59.33%
McAfee Total Protection 2008	3,736.00	56.27%
Industry Average	2,390.70	0.00%
Windows OneCare 2.0	2,258.00	-5.55%
Norton 360 v2	1,080.00	-54.82%
BitDefender Total Security 2008	1,070.50	-55.22%

Memory Utilization

Product Name	RAM (MB)	Average
Trend Micro IS Pro 2008	70.49	97.10%
McAfee Total Protection 2008	66.05	84.70%
Industry Average	35.76	0.00%
Windows OneCare 2.0	33.00	-7.73%
Norton 360 v2	5.82	-83.73%
BitDefender Total Security 2008	3.45	-90.35%

HTTP Download Speed

Product Name	Time (ms)	Average
BitDefender Total Security 2008	91,628.47	123.54%
McAfee Total Protection 2008	52,531.29	28.16%
Industry Average	40,988.94	0.00%
Norton 360 v2	22,016.64	-46.29%
Windows OneCare 2.0	20,392.60	-50.25%
Trend Micro IS Pro 2008	18,375.71	-55.17%

Initial IE Launch Speed

Product Name	Time (ms)	Average
Trend Micro IS Pro 2008	5,553.60	85.43%
Industry Average	2,995.06	0.00%
BitDefender Total Security 2008	2,780.20	-7.17%
Windows OneCare 2.0	2,545.00	-15.03%
Norton 360 v2	2,293.00	-23.44%
McAfee Total Protection 2008	1,803.50	-39.78%

Subsequent IE Launch Speed

Product Name	Time (ms)	Average
Trend Micro IS Pro 2008	1,351.10	54.73%
Norton 360 v2	1,054.70	20.79%
Industry Average	873.17	0.00%
McAfee Total Protection 2008	819.00	-6.20%
BitDefender Total Security 2008	803.67	-7.96%
Windows OneCare 2.0	337.40	-61.36%

Installation Time

Product Name	Time (Sec)	Average
Norton 360 v2	423.61	54.09%
Windows OneCare 2.0	320.81	16.69%
Industry Average	274.92	0.00%
McAfee Total Protection 2008	270.00	-1.79%
Trend Micro IS Pro 2008	261.78	-4.78%
BitDefender Total Security 2008	98.38	-64.21%

Installation Size

Product Name	Size (MB)	Average
Norton 360 v2	761.33	114.86%
Industry Average	354.34	0.00%
Trend Micro IS Pro 2008	330.73	-6.66%
McAfee Total Protection 2008	259.45	-26.78%
Windows OneCare 2.0	225.98	-36.22%
BitDefender Total Security 2008	194.18	-45.20%

Registry Key Count

Product Name	Keys	Average
Norton 360 v2	12,183	74.31%
McAfee Total Protection 2008	7,396	5.82%
Industry Average	6,989	0.00%
Trend Micro IS Pro 2008	6,362	-8.97%
BitDefender Total Security 2008	4,635	-33.68%
Windows OneCare 2.0	4,370	-37.47%

File Copy, Move and Delete

Product Name	Time (Sec)	Average
Trend Micro IS Pro 2008	179.25	23.49%
BitDefender Total Security 2008	155.45	7.09%
Industry Average	145.15	0.00%
McAfee Total Protection 2008	143.79	-0.94%
Windows OneCare 2.0	135.50	-6.65%
Norton 360 v2	111.78	-22.99%

Third Party Program Installation

Product Name	Time (Sec)	Average
Trend Micro IS Pro 2008	68.44	36.88%
Norton 360 v2	51.71	3.43%
Industry Average	50.00	0.00%
BitDefender Total Security 2008	48.36	-3.27%
McAfee Total Protection 2008	41.06	-17.88%
Windows OneCare 2.0	40.42	-19.16%

Binary Download Speed

Product Name	Time (Sec)	Average
Trend Micro IS Pro 2008	113.91	11.63%
Norton 360 v2	107.61	5.46%
Industry Average	102.04	0.00%
BitDefender Total Security 2008	101.42	-0.61%
Windows OneCare 2.0	94.60	-7.29%
McAfee Total Protection 2008	92.65	-9.20%

File Format Conversion

Product Name	Time (Sec)	Average
Norton 360 v2	32.36	7.16%
Trend Micro IS Pro 2008	31.25	3.46%
Industry Average	30.20	0.00%
Windows OneCare 2.0	29.86	-1.15%
BitDefender Total Security 2008	29.12	-3.57%
McAfee Total Protection 2008	28.42	-5.90%

File Compression and Decompression

Product Name	Time (Sec)	Average
Trend Micro IS Pro 2008	188.93	13.65%
BitDefender Total Security 2008	171.04	2.90%
Industry Average	166.23	0.00%
Norton 360 v2	165.13	-0.66%
Windows OneCare 2.0	162.86	-2.03%
McAfee Total Protection 2008	143.19	-13.86%

File Write, Open and Close

Product Name	Time (Sec)	Average
BitDefender Total Security 2008*	4,237.05	402.06%
McAfee Total Protection 2008	1,564.33	85.36%
Windows OneCare 2.0	1,128.28	33.69%
Industry Average	843.93	0.00%
Norton 360 v2	521.16	-38.25%
Trend Micro IS Pro 2008	161.95	-80.81%