PASSMARK® SOFTWARE

Faronics Anti-Virus vs. Seven Competitors (August 2014)

Performance Benchmark

Document: Faronics Anti-Virus vs. Seven Competitors (August 2014)
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Date: 12 August 2014
File: Faronics_Antivirus_vs_Competitors.docx
Edition 1

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Revision History

Rev	Revision History	Date
Edition 1	Initial version of this report. Competitor results taken from a previously published report (See References below).	12 August 2014

References

Ref #	Document	Author	Date
1	**What Really Slows Windows Down** (URL)	O. Warner, The PC Spy	2001-2014
2	**Webroot SecureAnywhere Business Endpoint Protection vs. Seven Competitors** (February 2014)	M. Baquiran, D. Wren	19 February 2014

Executive Summary

PassMark Software® conducted objective performance testing on eight (8) security software products, on Windows 7 Ultimate Edition (64-bit) between January and July 2014. This report presents our results and findings as a result of performance benchmark testing conducted for these endpoint security products.

The aim of this report is to compare the performance impact of Faronics Anti-Virus product with seven (7) competitor products, of which the results have been taken from a previously published performance benchmark report (see References).

Testing was performed on all products using ten (10) performance metrics. These performance metrics are as follows:

- Installation Time;
- Installation Size;
- Boot Time;
- CPU Usage during Scan;
- Memory Usage during Initial Scan;
- Scheduled Scan Time;
- File Copy, Move, and Delete;
- File Compression and Decompression;
- File Write, Open, and Close; and
- Network Throughput.

Overall Score

PassMark Software assigned every product a score depending on its ranking in each metric compared to other products in the same category. In the following table, the highest possible score attainable is 80; in a hypothetical situation where a product has attained first place in all ten (10) metrics. Endpoint products have been ranked by their overall scores:

Product Name	Overall Score
Faronics Anti-Virus	62
ESET NOD32 Antivirus Business	55
Microsoft Security Center Endpoint Protection	51
Symantec Endpoint Protection Small Business Edition	48
Sophos EndUser Protection – Business	46
Trend Micro Worry Free Business Security Standard	33
McAfee Complete Endpoint Protection – Business	29
Kaspersky Endpoint Security	29

Products and Versions

For each security product, we have tested the most current and available version.

Manufacturer	Product Name	Product Version	Date Tested
Faronics Corporation	Faronics Anti-Virus	3.42.2102.251	July 2014
Trend Micro Inc.	Trend Micro Worry Free Business Security Standard	7.0.1638	Jan 2014
Kaspersky Lab	Kaspersky Endpoint Security	10.2.1.23	Jan 2014
Sophos	Sophos EndUser Protection – Business	Sophos Endpoint Security and Control 10.3	Jan 2014
McAfee, Inc.	McAfee Complete Endpoint Protection - Business	VirusScan, AntiSpyware Enterprise 8.8	Jan 2014
Symantec Corp	Symantec Endpoint Protection Small Business Edition 2013 (Symantec .cloud)	Cloud Agent x64 2.03.23.2539 Endpoint Protection NIS-20.4.0.40	Jan 2014
ESET, spol. s r.o.	ESET NOD32 Antivirus Business	4.2.76.0	Jan 2014
Microsoft Corporation	Microsoft System Center Endpoint Protection	4.3.220.0	Jan 2014

Performance Metrics Summary

We have selected a set of objective metrics which provide a comprehensive and realistic indication of the areas in which endpoint protection products may impact system performance for end users. Our metrics test the impact of the 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.

Benchmark 1 – Installation Time

The speed and ease of the installation process will strongly influence the user's first impression of the security software. This test measures the installation time required by the security software to be fully functional and ready for use by the end-user. Lower installation times represent security products which are quicker for a user to install.

Benchmark 2 – Installation Size

In offering new features and functionality to users, security software products tend to increase in size with each new release. Although new technologies push the size limits of hard drives each year, the growing disk space requirements of common applications and the increasing popularity of large media files (such as movies, photos and music) ensure that a product's installation size will remain of interest to home users.

This metric aims to measure a product's total installation size. This metric is defined as the total disk space consumed by all new files added during a product's installation.

Benchmark 3 – 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 4 – CPU Usage during Scan

The amount of load on the CPU while security software conducts a malware scan may prevent the reasonable use of the endpoint machine until the scan has completed. This metric measured the percentage of CPU used by security software when performing a scan.

Benchmark 5 – Memory Usage during Initial Scan

This metric measures the amount of memory (RAM) used by the product during an initial security scan. The total memory usage was calculated by identifying all security software processes and the amount of memory used by each process during the scan.

Benchmark 6 – Scheduled Scan Time

Most anti-virus solutions are scheduled by default to scan the system regularly for viruses and malware. This metric measured the amount of time required to run a scheduled scan on the system. The scan is set to run at a specified time via the client user interface.

Benchmark 7 – File Copy, Move, and Delete

This metric measures the amount of time taken to copy, move 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 (for example, Microsoft Office documents, Adobe PDF, Zip files, etc), media formats (for example, images, movies and music) and system files (for example, executables, libraries, etc).

Benchmark 8 – 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 9 – 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 10 – Network Throughput

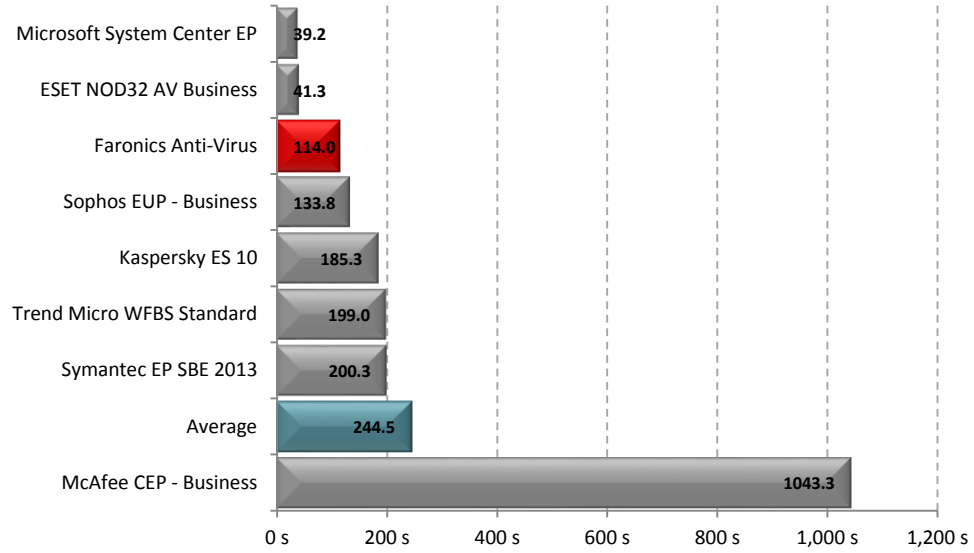
The metric measures the amount of time taken to download a variety of files from a local server using the HyperText Transfer Protocol (HTTP), which is the main protocol used on the web for browsing, linking and data transfer. Files used in this test include file formats that users would typically download from the web, such as images, archives, music files and movie files.

Test Results

In the following charts, we have highlighted the results we obtained for Faronics Anti-Virus in red. The competitor average has also been highlighted in blue for ease of comparison.

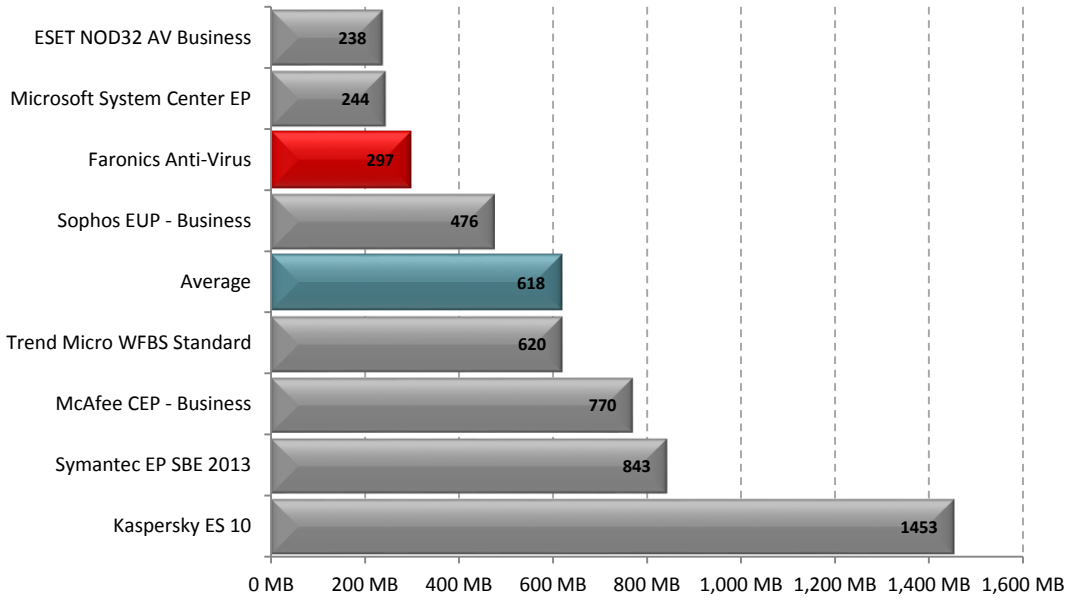
Benchmark 1 – Installation Time

The following chart compares the minimum installation time it takes for endpoint 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.



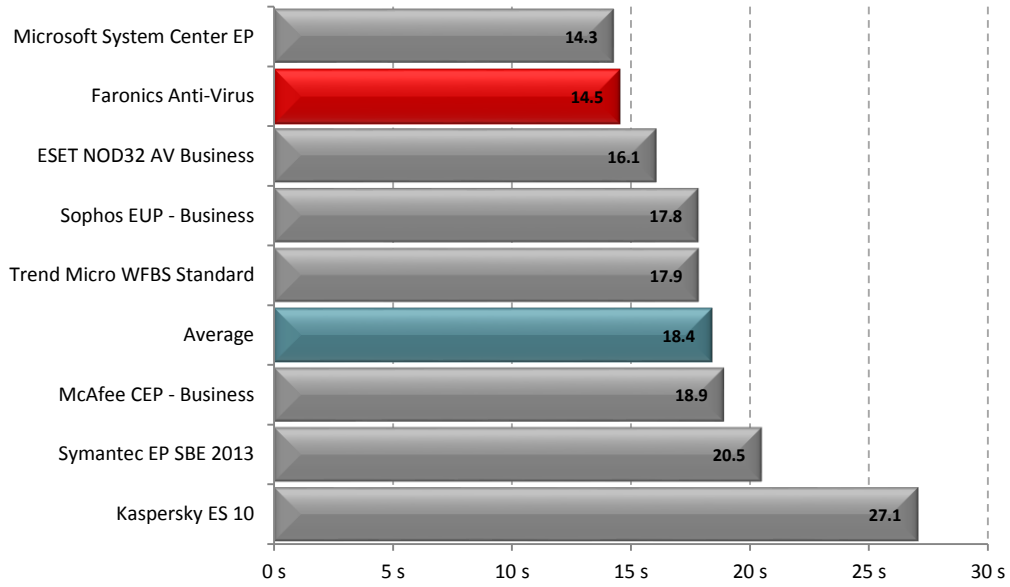
Benchmark 2 – Installation Size

The following chart compares the total size of files added during the installation of endpoint security products. Products with lower installation sizes are considered better performing products in this category.



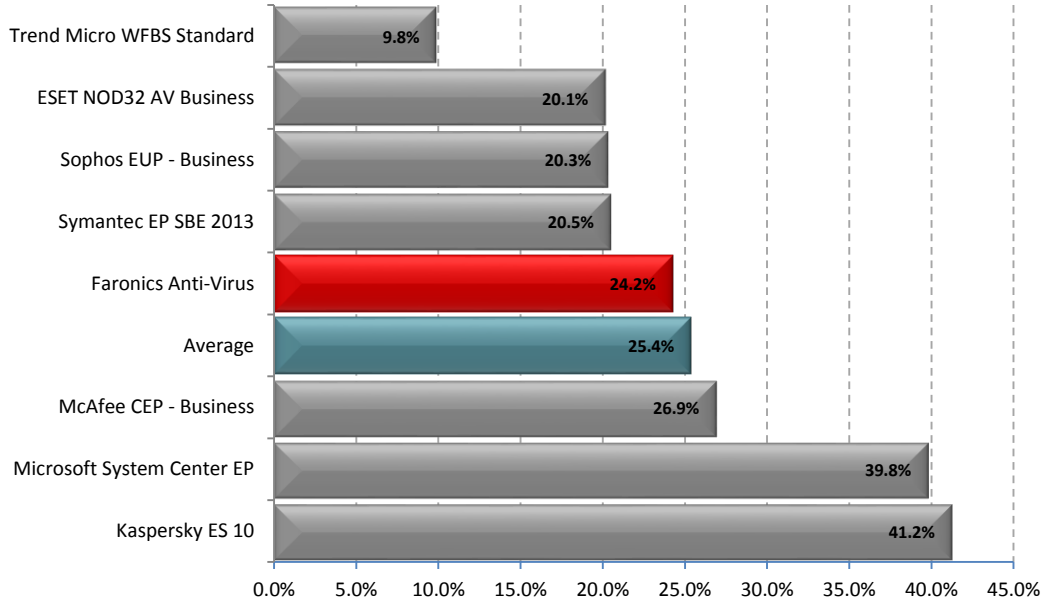
Benchmark 3 – Boot Time

The following chart compares the average time taken for the system to boot (from a sample of five boots) for each endpoint security product tested. Products with lower boot times are considered better performing products in this category.



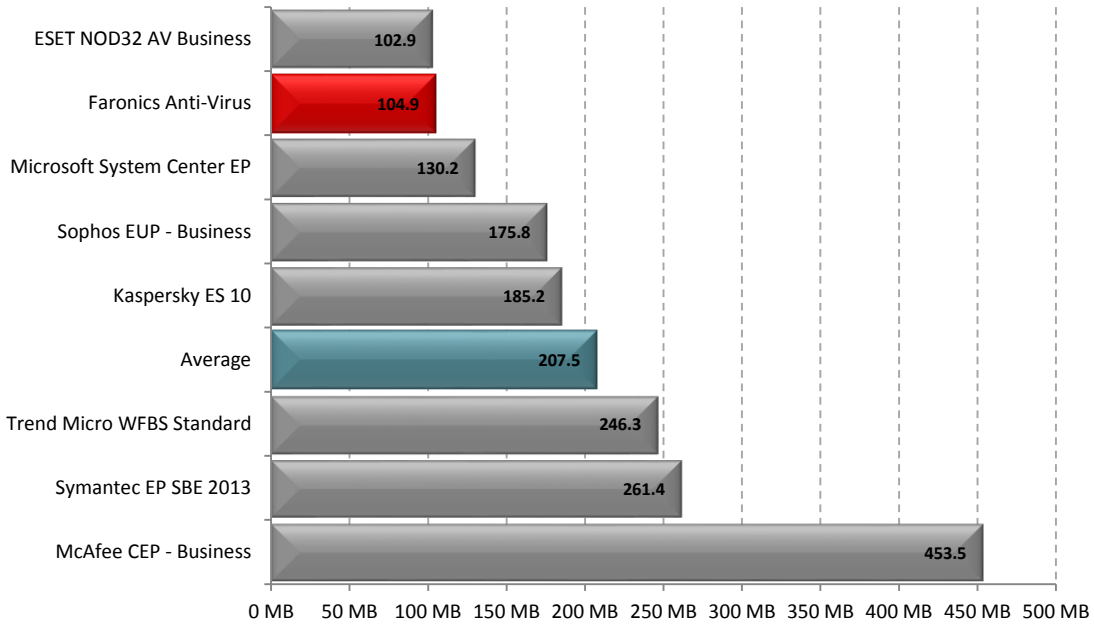
Benchmark 4 – CPU Usage during Scan

The following chart compares the average CPU usage during a scan of a set of media files, system files and Microsoft Office documents that totaled 5.42 GB. Products with lower CPU usage are considered better performing products in this category.



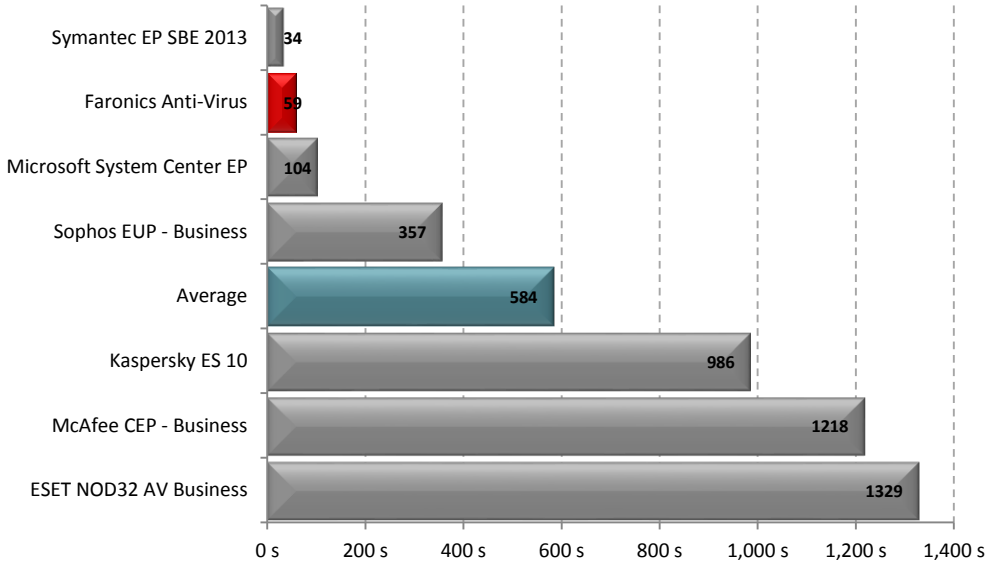
Benchmark 5 – Memory Usage during Initial Scan

The following chart compares the average amount of RAM in use by an endpoint security product during an initial scan on the main drive. This average is taken from a sample of ten memory snapshots taken at five second intervals during a scan of sample files which have not been previously scanned by the software. Products that use less memory during a scan are considered better performing products in this category.



Benchmark 6 – Scheduled Scan Time

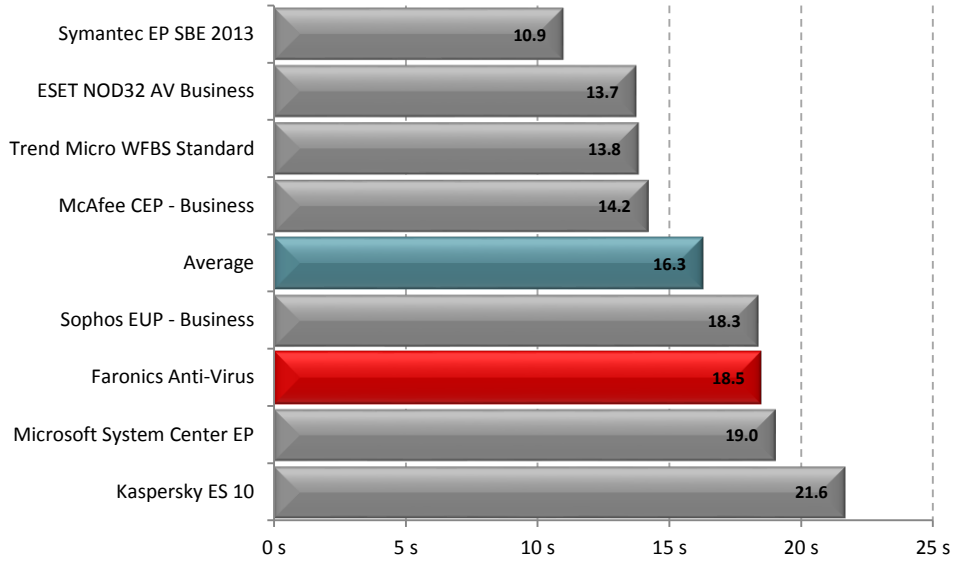
The following chart compares the average time taken to run a scheduled scan on the system for each security product tested.*



*Trend Micro's product was omitted from the chart and given the lowest score. The scheduled scan time could not be run to completion due to what appears to be a bug.

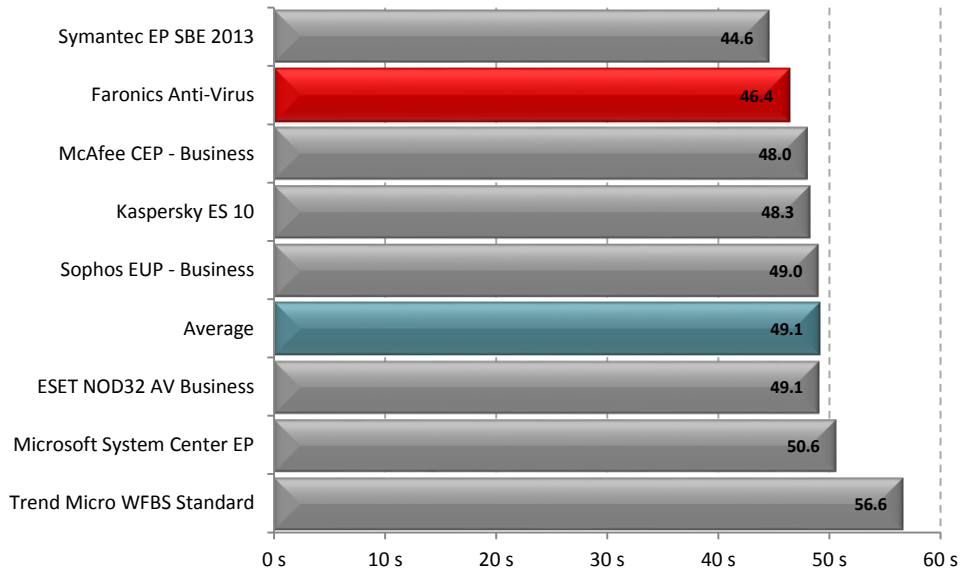
Benchmark 7 – File Copy, Move, and Delete

The following chart compares the average time taken to copy, move and delete several sets of sample files for each endpoint security product tested. Products with lower times are considered better performing products in this category.



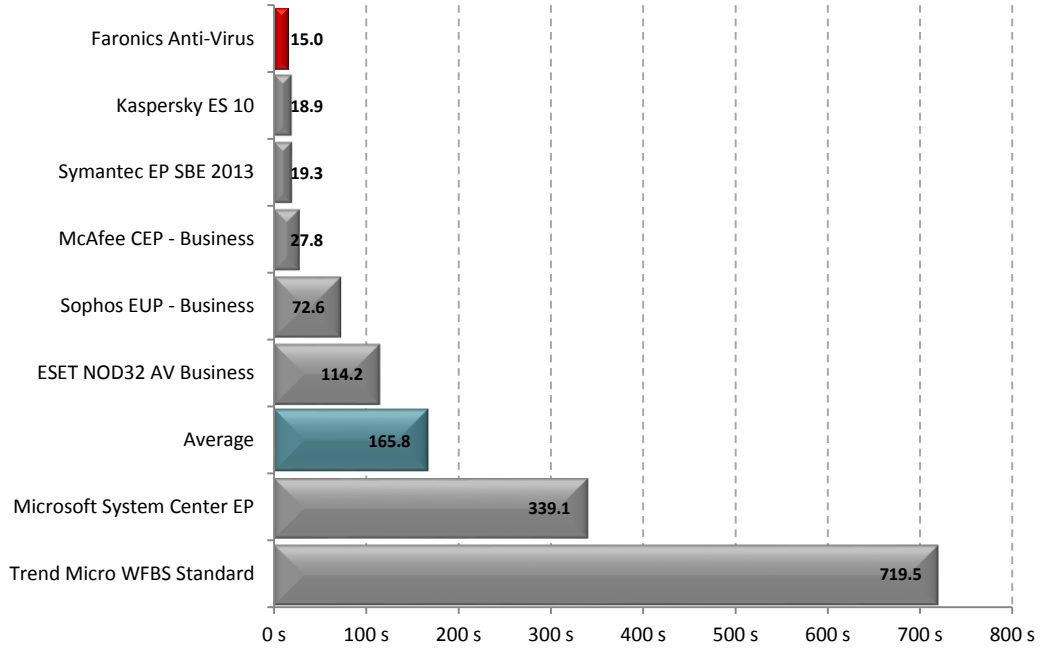
Benchmark 8 – File Compression and Decompression

The following chart compares the average time it takes for sample files to be compressed and decompressed for each endpoint security product tested. Products with lower times are considered better performing products in this category.



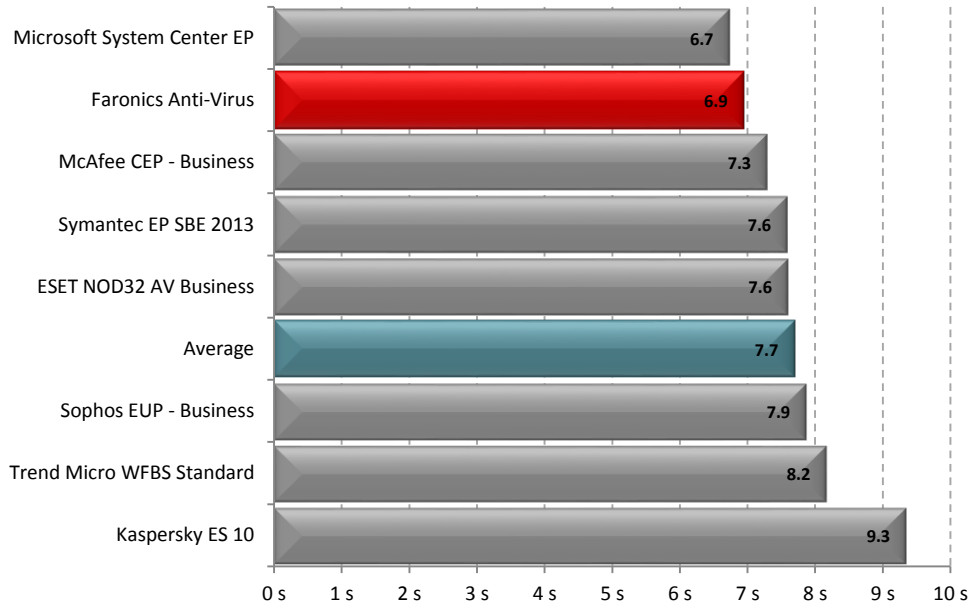
Benchmark 9 – File Write, Open, and Close

The following chart compares the average time it takes for a file to be written to the hard drive then opened and closed 180,000 times, for each endpoint security product tested. Products with lower times are considered better performing products in this category.



Benchmark 10 – Network Throughput

The following chart compares the average time to download a sample set of common file types for each endpoint security product tested. Products with lower times are considered better performing products in this category.



Disclaimer and Disclosure

This report only covers versions of products that were available at the time of testing. The tested versions are as noted in the "Products and Versions" section of this report. 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

Faronics Corporation funded the writing of this report. The list of products tested and the metrics included in the report were selected by Faronics.

Trademarks

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Appendix 1 – Test Environment

Endpoint Machine – Windows 7 (64-bit)

For our testing, PassMark Software used a test environment running Windows 7 Ultimate (64-bit) with the following hardware specifications:

Model:	HP Pavilion P6-2300A
CPU:	Intel Core i5 3330 @ 2.66GHz
Video Card:	1GB nVIDIA GeForce GT 620M
Motherboard:	Foxconn 2ABF 3.10
RAM:	6GB DDR3 RAM
HDD:	Hitachi HDS721010CLA630 931.51GB
Network:	Gigabit (1GB/s)

Web Page and File Server – Windows 2012 (64-bit)

The Web and File server was not benchmarked directly, but served the web pages and files to the endpoint machine during performance testing.

CPU:	Intel Xeon E3-1220v2 CPU
Video Card:	Kingston 8GB (2 x 4GB ECC RAM)
Motherboard:	Intel S1200BTL Server
RAM:	Kingston 8GB (2 x 4GB) ECC RAM, 1333Mhz
SSD:	OCZ 128GB 2.5” Solid State Disk
Network:	Gigabit (1GB/s)

Appendix 2 – Methodology Description

Windows 7 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 7 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 test) purposes.
12. Disabled updates, accelerators and compatibility view updates in Internet Explorer 8.
13. Update to Windows Service Pack 1
14. Created a baseline image using Norton Ghost.

Benchmark 1 – 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** consists of file extraction, the EULA prompt, product activation and user configurable options for installation.

- The **File Copy phase** occurs when the product is being installed; usually this phase is indicated by a progress bar.

- The **Post-Installation phase** 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 (for example, website link checking software as part of a Security Product).

Installation time includes the time taken by the product installer to download components required in the installation. This may include mandatory updates or the delivery of the application itself from a download manager. We have noted in our results where a product has downloaded components for product installation.

We have excluded product activation times due to network variability in contacting vendor servers or time taken in account creation. For all products tested, the installation was performed directly on the endpoint, either using a standalone installation package or via the management server web console.

Benchmark 2 – Installation Size

A product's Installation Size was previously defined as the difference between the initial snapshot of the Disk Space (C: drive) before installation and the subsequent snapshot taken after the product is installed on the system. Although this is a widely used methodology, we noticed that the results it yielded were not always reproducible in Windows Vista due to random OS operations that may take place between the two snapshots. We improved the Installation Size methodology by removing as many Operating System and disk space variables as possible.

Using PassMark's **OSForensics 2.2** we created initial and post-installation disk signatures for each product. These disk signatures recorded the amount of files and directories, and complete details of all files on that drive (including file name, file size, checksum, etc) at the time the signature was taken.

The initial disk signature was taken immediately prior to installation of the product. A subsequent disk signature was taken immediately following a system reboot after product installation. Using **OSForensics**, we compared the two signatures and calculated the total disk space consumed by files that were new, modified, and deleted during product installation. Our result for this metric reflects the total size of all newly added files during installation.

The scope of this metric includes only an 'out of the box' installation size for each product. Our result does not cover the size of files downloaded by the product after its installation (such as engine or signature updates), or any files created by system restore points, pre-fetch files and other temporary files.

Benchmark 3 – Boot Time

PassMark Software uses tools available from the **Windows Performance Toolkit version 4.6** (as part of the Microsoft Windows 7 SDK obtainable from the Microsoft Website) with a view to obtaining more precise and consistent boot time results on the Windows 7 platform.

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 5 – CPU Usage during Scan

CPUAvg is a command-line tool which samples the amount of CPU load approximately two times per second. From this, ***CPUAvg*** calculates and displays the average CPU load for the interval of time for which it has been active.

For this metric, ***CPUAvg*** was used to measure the CPU load on average (as a percentage) by the system while the On-Demand Scan Time test was being conducted. The final result was calculated as an average five sets of thirty CPU load samples.

Benchmark 7 – Memory Usage during Initial Scan

The ***MemLog++*** utility was used to record memory usage on the system while a malware scan is in progress. Please refer to the metric **"Memory usage – System Idle"** above for a description of the ***MemLog++*** Utility and an explanation of the method by which memory usage is calculated.

As some products cache scan locations, we take reasonable precautions to ensure that the security software does not scan the C:\ drive at any point before conducting this test. A manual scan on the C:\ drive is initiated at the same time as the ***MemLog++*** utility, enabling ***MemLog++*** to record memory usage for 120 seconds at 12 second intervals.

Benchmark 8 – Scheduled Scan Time

This scan is configured as a full system scheduled scan from user interface. The default scheduled scan settings are kept (except for the start time) and the scan is scheduled to run at the next convenient time. 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.

The scan is run three times with a reboot between each run to remove potential caching effects. In the past, many products have shown 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. Where this option is not available, the product is omitted from the metric, and given the lowest score for this metric.

Benchmarks 7-10 – Real-Time Performance

We used a single script in testing Benchmarks 8-10. The script consecutively executes tests for Benchmarks 10-13. The script times each phase in these benchmarks using ***CommandTimer.exe*** and appends results to a log file.

Benchmarks 7 – 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	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 8 – 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 9 – 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 10 – Network Throughput

This benchmark measured how much time was required to download a sample set of binary files of various sizes and types over a 100MB/s network connection. The files were hosted on a server machine running Windows Server 2012 and IIS 7. ***CommandTimer.exe*** was used in conjunction with ***GNU Wget*** (version 1.10.1) 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	Number	Size (bytes)
JPEG	343	30,668,312
GIF	9	360,349
PNG	5	494,780
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
PDF	73	136,298,049
ZIP	4	6,295,987
7Z	1	92,238
Total	**484**	**553,638,694**

This test was conducted 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.