PASSMARK® SOFTWARE

Enterprise Endpoint Protection Performance Benchmarks

Windows 7

September 2010

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Report: 1

Executive Summary

PassMark Software® conducted objective performance testing on five, publically available enterprise endpoint protection security software products on Windows 7 Ultimate Edition in September 2010.

The highest possible score attainable is 70. Symantec Endpoint Protection ranked in first place with a score of 54.

Product Name	Overall Score
Symantec Endpoint Protection	54
Kaspersky Business Space Security	44
Trend Micro OfficeScan	42
Sophos Endpoint Security	38
McAfee Total Protection for Endpoint	32

This Overall Score provides a high level indication of that product's performance compared to other products we have tested. Each product scored points based on its rank in each test;

Test Rank	Points Scored
1	5
2	4
3	3
4	2
5	1

Testing was performed on all products using fourteen performance metrics. These performance metrics are as follows:

- Installation Time
- Boot Time
- Scan Time on Demand
- Scan Time on Schedule
- Average CPU Usage During Scan
- User Interface Launch Time
- Word Document Open Time
- Internet Explorer Launch Time
- Browse Time
- Network Throughput
- File Copy, Move and Delete
- File Compress and Decompress
- Memory Usage during System Idle
- Average CPU Usage During Idle

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Revision History

Rev	Revision History	Date
Report 1	Initial version of this report	27 September 2010

Products and Versions

In this report, we have tested or included the following versions of Endpoint Protection software[1]:

Manufacturer	Product Name	Release Year	Product Version
Symantec	Endpoint Protection[2]	2010	11.0.6100.645
McAfee	Total Protection for Endpoint	2010	4.5.1
Trend Micro	OfficeScan	2010	10.5.1083
Sophos	Endpoint Security	2010	9.5
Kaspersky	Business Space Security	2010	6.0.4.1424

[1] All Products were tested using their default settings

[2] Intrusion Prevention System (IPS) is enabled in Symantec Endpoint Protection by default

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

This test measures the minimum installation time required by the software to be fully functional and ready for use by the end user. Lower installation times represent products which are quicker for a user to install

Benchmark 2 – User Interface Launch Time

This metric provides an objective indication as to how responsive a security product appears to the user, by measuring the amount of time it takes for the user interface of the endpoint protection software to launch from Windows. To allow for caching effects by the operating system, both the initial launch time and the subsequent launch times were measured. Our final result is an average of these two measurements.

Benchmark 3 – Word Document Open Time

The average launch time of Word interface was taken using *AppTimer*. This includes the time to launch the Word 2007 application and open a 10MB document. This test was practically identical to the User Interface launch time test. For each product tested, we obtained a total of fifteen samples from five sets of three Word launches, with a reboot before each set to clear caching effects by the operating system. 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.

We have averaged the subsequent launch times to obtain an average subsequent launch time. Our final result for this test is an average of the subsequent launch average and the initial launch time.

Benchmark 4 – Internet Explorer Launch Time

This metric is one of many methods to objectively measure how much a product impacts on the responsiveness of the system. This metric measures the amount of time it takes to launch the user interface of Internet Explorer 8. To allow for caching effects by the operating system, both the initial launch time and the subsequent launch times were measured. Our final result is an average of these two measurements.

Benchmark 5 – 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 6 – Scan Time on Demand

All endpoint protection solutions have functionality designed to detect viruses and various other forms of malware by scanning files on the system. This metric measured the amount of time required to scan a set of clean files. Our sample file set comprised a total file size of 5.42 GB and was made up of files that would typically be found on end-user machines, such as media files, system files and Microsoft Office documents.

Benchmark 7 – Scan Time on Schedule

The test is performed on a copy of the test files used in **Benchmark 3 – Scan Time on Demand** above, however the scan is set for a particular time via the client user interface or where the option isn't available on the client using the management console.

Benchmark 8 – Average CPU Usage during Scan

This metric measures the amount of CPU used when performing a scan.

Benchmark 9 – Browse Time

It is common behaviour for endpoint protection products to scan data for malware as it is downloaded from the internet or intranet. This behaviour may negatively impact browsing speed as products scan web content for malware. This metric measures the time taken to browse a set of popular internet sites to consecutively load from a local server in a user's browser window.

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.

Benchmark 11 – File Copy, Move and Delete

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

Benchmark 12 – File Compress and Decompress

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 13 – Memory Usage during System Idle

This metric measures the amount of memory (RAM) used by the product while the machine and endpoint protection software are in an idle state. The total memory usage was calculated by identifying all endpoint protection software processes and the amount of memory used by each process.

The amount of memory used while the machine is idle provides a good indication of the amount of system resources being consumed by the endpoint protection software on a permanent basis. Better performing products occupy less memory while the machine is idle.

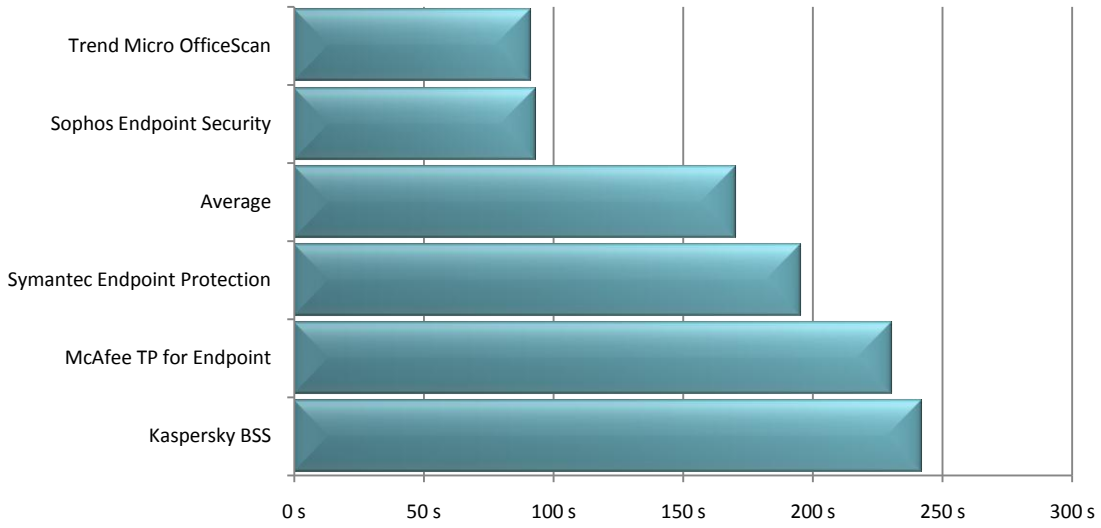
Benchmark 14 – Average CPU Usage during Idle

This metric measures the amount of CPU used when the system and product are both idle.

Test Results

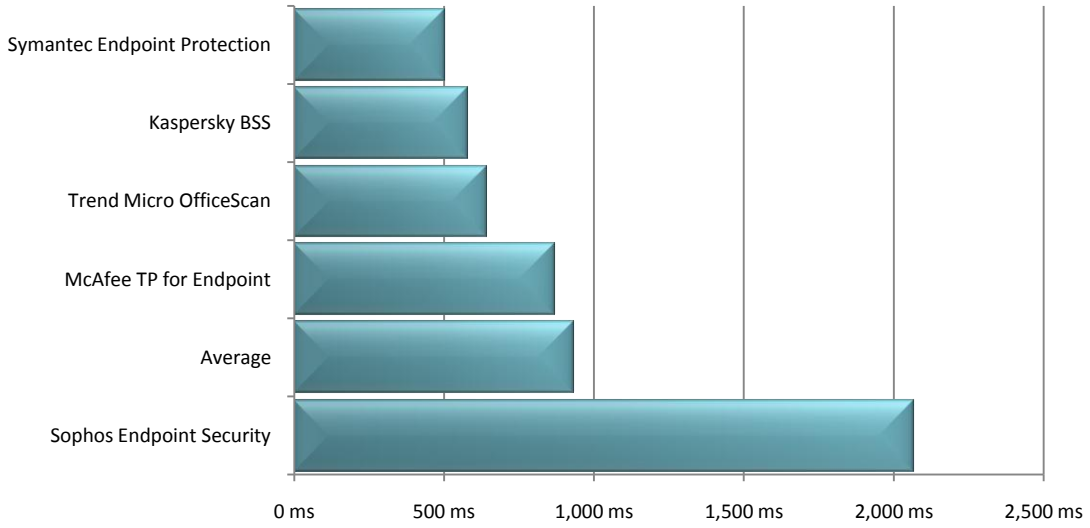
Benchmark 1 – Installation Time (seconds)

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



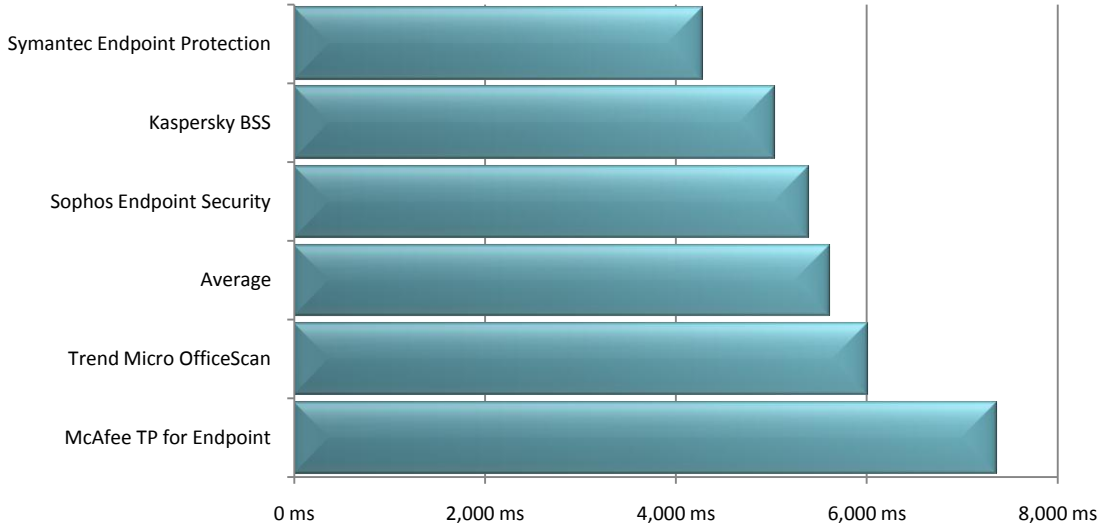
Benchmark 2 – User Interface Launch Time (milliseconds)

The following chart compares the average time taken to launch a product's user interface. Products with lower launch times are considered better performing products in this category.



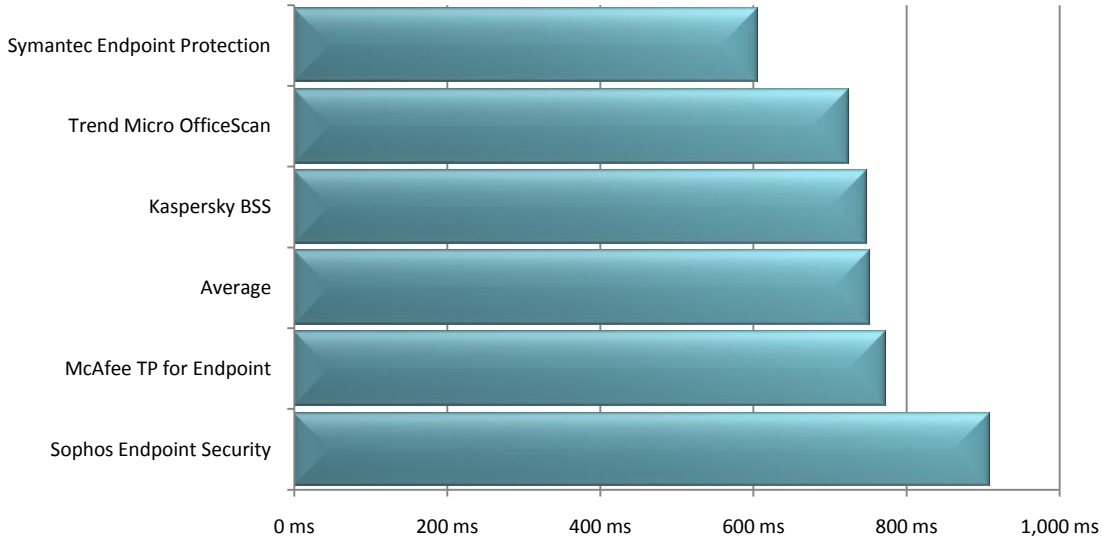
Benchmark 3 – Word Document Launch Time (milliseconds)

The following chart compares the average time taken to launch Microsoft Word and open a 10MB document. Products with lower launch times are considered better performing products in this category.



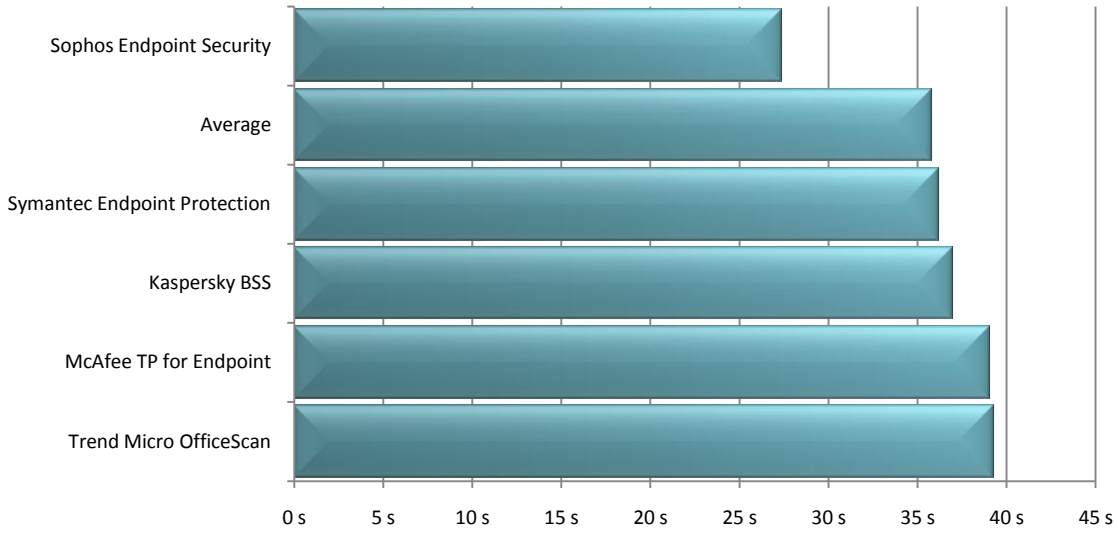
Benchmark 4 – Internet Explorer Launch Time (seconds)

The following chart compares the average time taken for Internet Explorer to successively load. Products with lower load times are considered better performing products in this category.



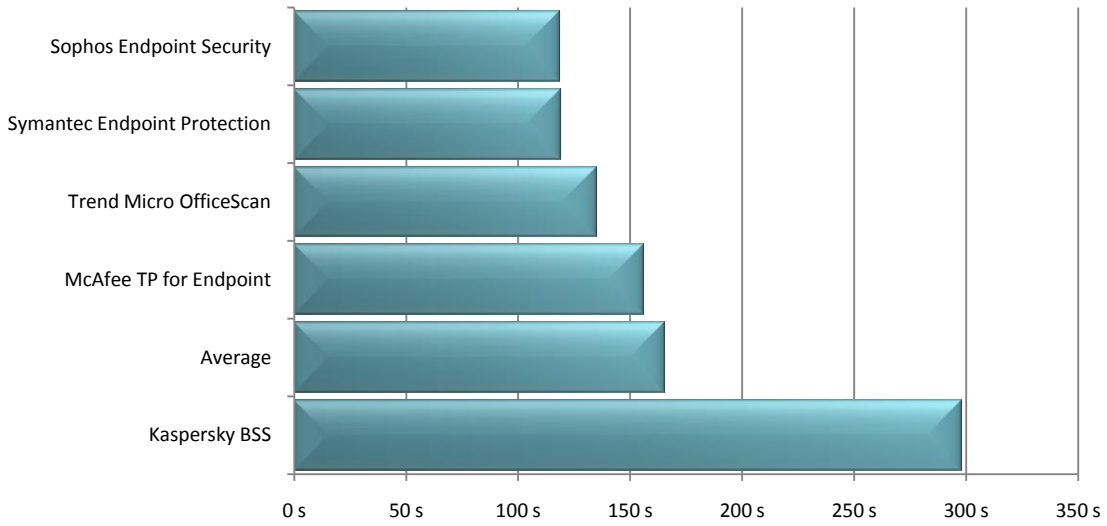
Benchmark 5 – Boot Time (seconds)

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



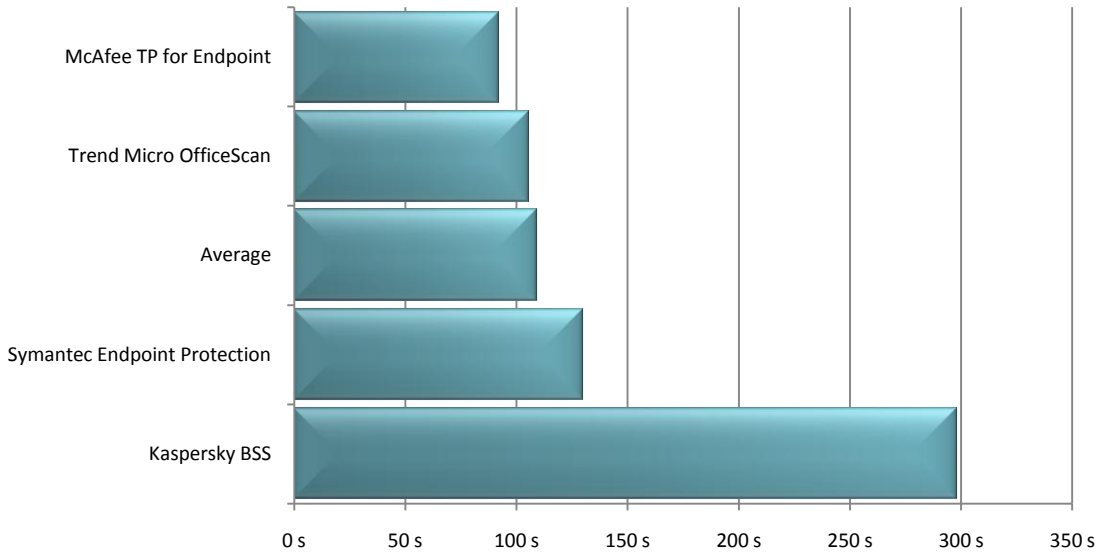
Benchmark 6 – Scan Time on Demand (seconds)

The following chart compares the average time taken to scan a set of media files, system files and Microsoft Office documents that totaled 5.42 GB. 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 7 – Scan Time on Schedule (seconds)

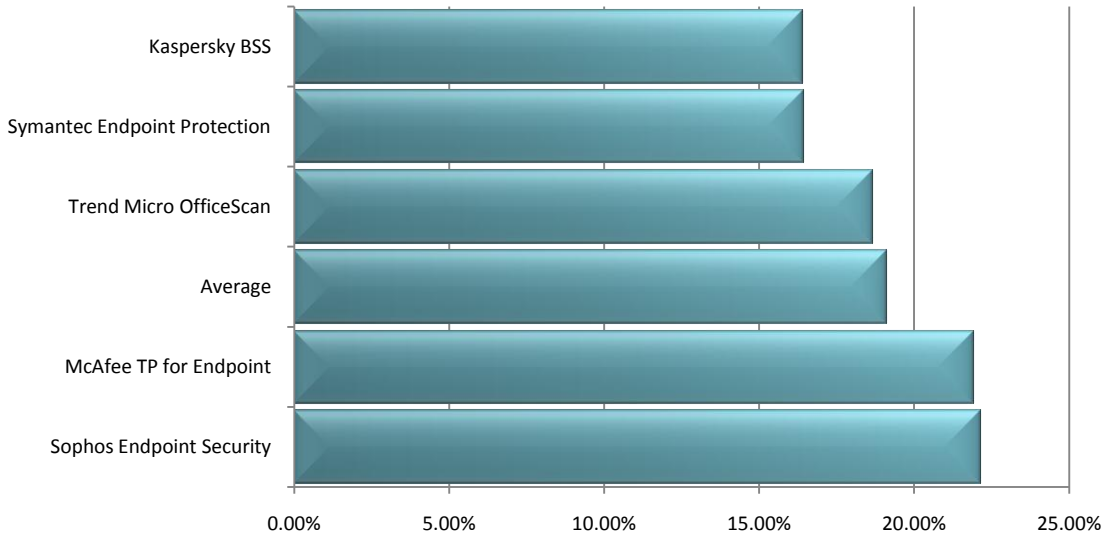
The following chart compares the average time taken to scan a set of media files, system files and Microsoft Office documents that totaled 5.42 GB. This time is calculated by averaging the initial (Run 1) and subsequent (Runs 2-5) scan times. Products with lower scan times are considered better performing products in this category.



*No result was obtained for Sophos Endpoint Security for this test, there was no option to schedule a scan for a specific folder

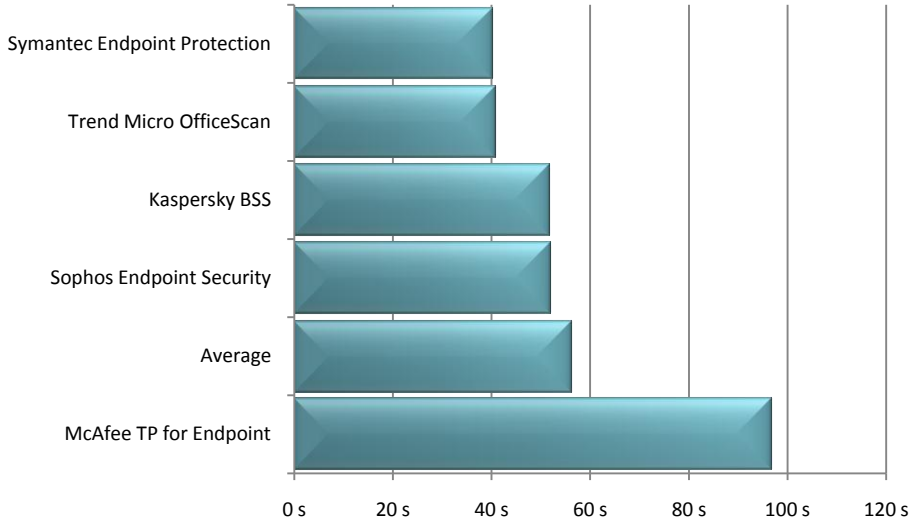
Benchmark 8 – CPU Usage during Scan (percent)

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. This value is calculated by averaging the initial (Run 1) and subsequent (Runs 2-5) CPU usage results. Products with lower CPU usage are considered better performing products in this category.



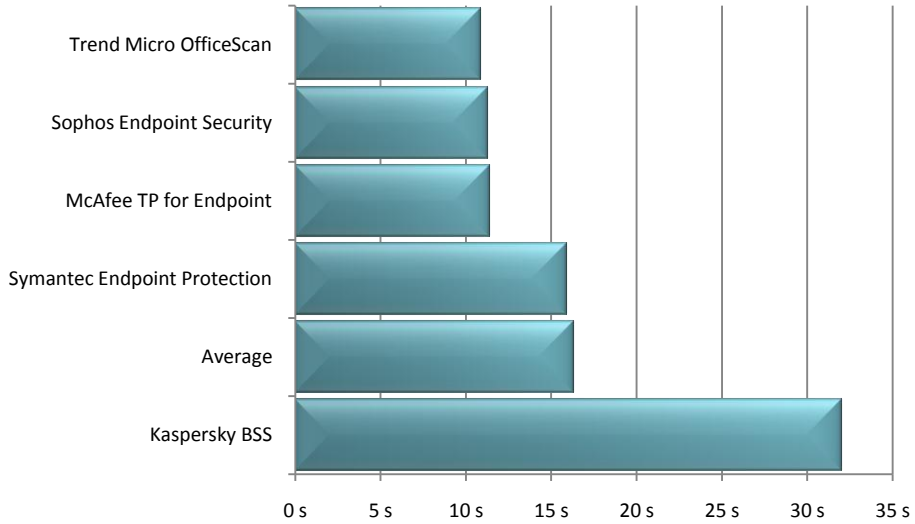
Benchmark 9 – Browse Time

The following chart compares the average time taken for Internet Explorer to successively load a set of popular websites through the local area network from a local server machine. Products with lower browse times are considered better performing products in this category



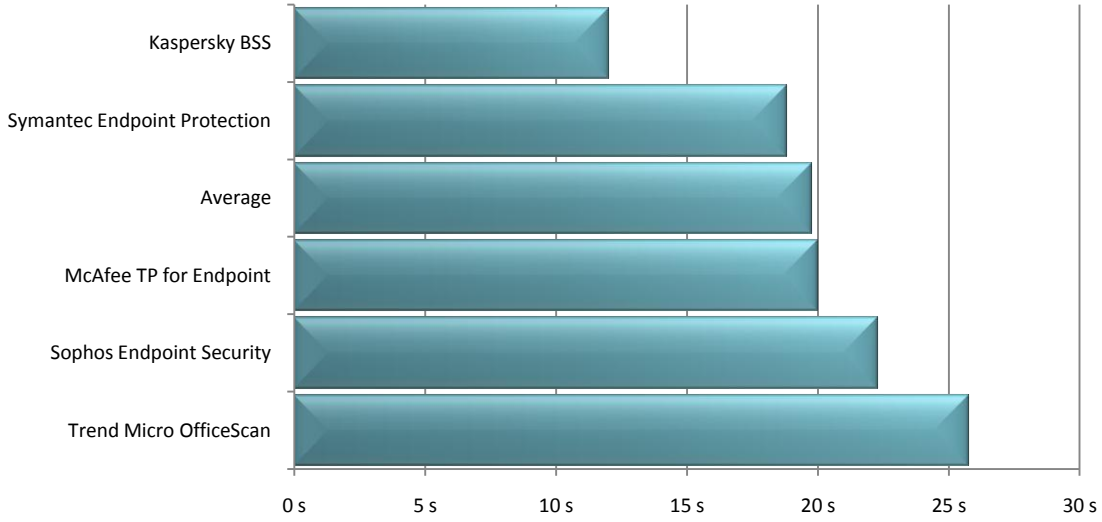
Benchmark 10 – Network Throughput (seconds)

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



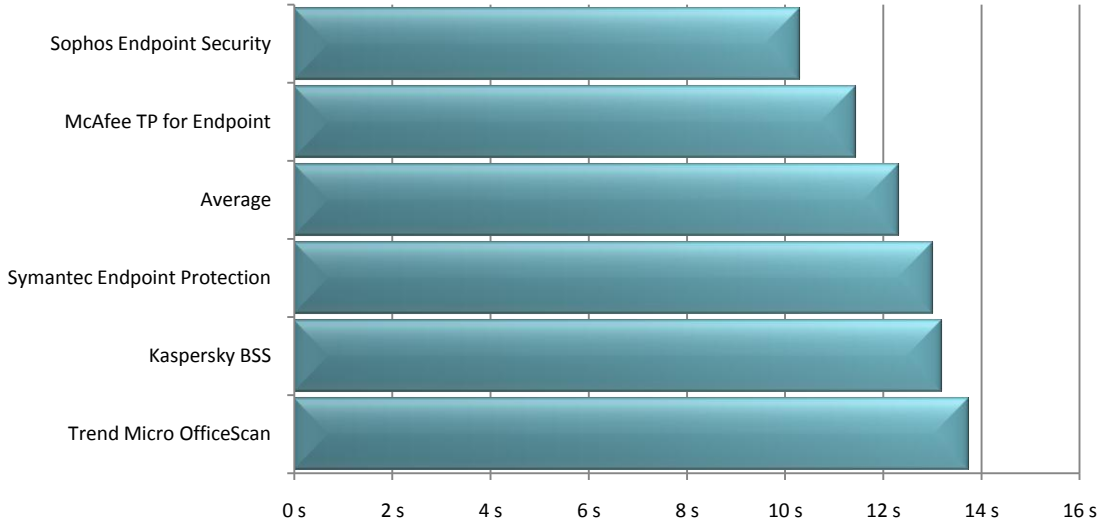
Benchmark 11 – File Copy, Move and Delete (seconds)

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



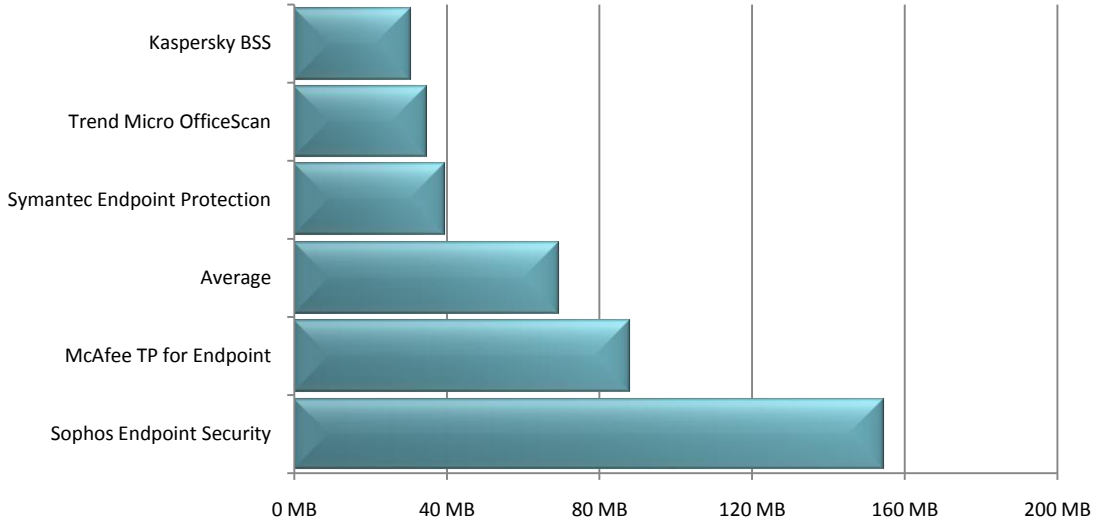
Benchmark 12 – File Compress and Decompress (seconds)

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



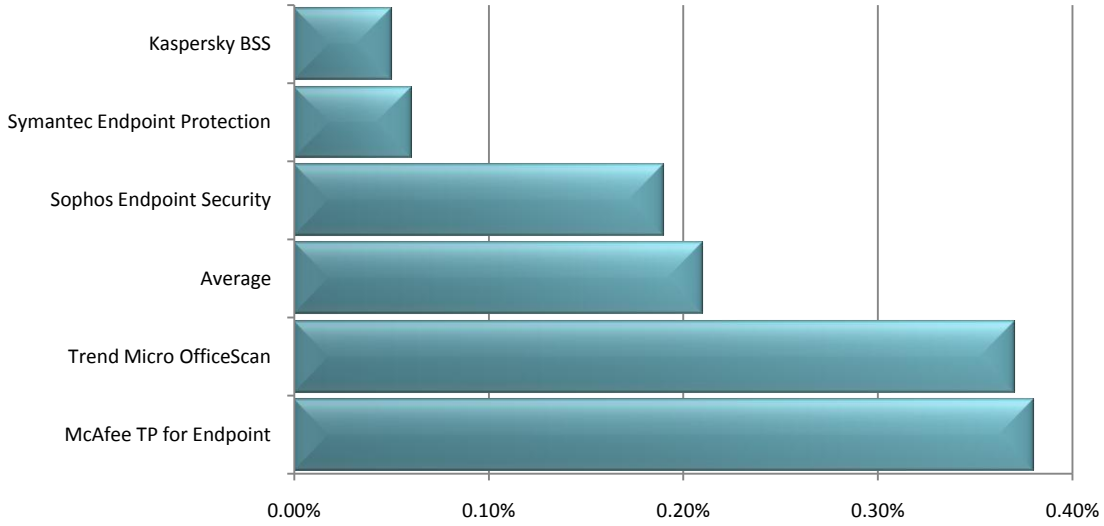
Benchmark 13 – Memory Usage during System Idle (megabytes)

The following chart compares the average amount of RAM in use by each product during a period of system idle. 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 14 – CPU Usage during Idle (percent)

The following chart compares the average CPU usage during system idle. This value is calculated by averaging the initial (Run 1) and subsequent (Runs 2-5) CPU usage results. Products with lower CPU usage 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

Symantec Corporation funded the production of this report and supplied some of the test scripts used for the tests.

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An electronic copy of this report can be found at the following location:
http://www.passmark.com/avreport

Appendix 1 – Test Environment

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

Windows 7 (64-bit) Endpoint System

CPU:	Intel Core i5 750 @ 2.66GHz
Video Card:	ATI Radeon 4350 1GB
Motherboard:	ASUS V-P7H55E, LGA1156
RAM:	4GB DDR3 RAM, 1333Mhz
HDD:	Samsung 1.5TB 7200RPM
Network:	Gigabit (1GB/s)

Web and File Server

The server is not being benchmarked directly. But is required to serve the web pages and files used during the tests on the end points.

CPU:	Pentium 4 3200 MHz
Video Card:	Integrated Video
Motherboard:	Intel D865PERL
RAM:	1GB
HDD:	Seagate ST380023AS 80GB
Network:	Gigabit (1GB/s)

Active Directory Server

The server is not being benchmarked. But is required for some products to facilitate the remote deployment of the products to the end points.

CPU:	Dual Xeon's 3.4Ghz
Video Card:	RADEON X600 PRO
Motherboard:	HP 08B4h
RAM:	2GB Registered ECC Infineon RAM
HDD:	74GB 10K, WD740GD-50FLA2 (Raptor)
Network:	Gigabit (1GB/s)

AV Management Console Server

The server is not being benchmarked. But is required for deployment of the end point software and to schedule malware scans. Virtual machines will be used for the management consoles of each product.

CPU:	AMD Phenom II x4 940 (Quad Core)
Video Card:	ASUS GeForce 9400GT
Motherboard:	Gigabyte GA-MA790XT-UD4P
RAM:	16GB PC3-10600 1333MHz DDR3 Memory
HDD:	Western Digital Caviar Green WD10EADS 1TB Serial ATA-II
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. Disabled updates, accelerators and compatibility view updates in Internet Explorer 8.
12. 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:

Where possible installation will be done via remote deployment. If this is not possible then a local install will be done. 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 Endpoint 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.

We have excluded product activation times due to network variability in contacting vendor servers or time taken in account creation.

Benchmark 2 – User Interface Launch Time

The launch time of a product's user interface was taken using ***AppTimer*** *(v1.0.1008)*. For each product tested, we obtained a total of fifteen samples from five sets of three UI launches, with a reboot before each set to clear caching effects by the operating system. 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.

We have averaged the subsequent launch times to obtain an average subsequent launch time. Our final result for this test is an average of the subsequent launch average and the initial launch time.

AppTimer is publically available from the PassMark Website.

Benchmark 3 – Word Document Open Time

The average launch time of Word interface was taken using *AppTimer*. This includes the time to launch the Word 2007 application and open a 10MB document. This test was practically identical to the User Interface launch time test. For each product tested, we obtained a total of fifteen samples from five sets of three Word launches, with a reboot before each set to clear caching effects by the operating system. 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.

We have averaged the subsequent launch times to obtain an average subsequent launch time. Our final result for this test is an average of the subsequent launch average and the initial launch time.

Benchmark 4 – Internet Explorer Launch Time

The average launch time of Internet Explorer interface was taken using *AppTimer*. This test was practically identical to the User Interface launch time test. For each product tested, we obtained a total of fifteen samples from five sets of three Internet Explorer launches, with a reboot before each set to clear caching effects by the operating system. 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.

For this test, we have used ***Internet Explorer 8*** (Version 8.0.6001.18783) as our test browser.

We have averaged the subsequent launch times to obtain an average subsequent launch time. Our final result for this test is an average of the subsequent launch average and the initial launch time.

Benchmark 5 – 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 6 – Scan Time on Demand

Scan Time is the time it took for each product to scan a set of sample files. The sample used was identical in all cases and contained a mixture of system files and Office files. In total there were 8502 files whose combined size was 5.42 GB. Most of these files come from the Windows system folders. As the file types can influence scanning speed, the breakdown of the main file types, file numbers and total sizes of the files in the sample set is given here.

.avi	247	1024MB	.jpg	2904	318MB	.wma	585	925MB
.dll	773	25MB	.mp3	333	2048MB	.xls	329	126MB
.exe	730	198MB	.png	451	27MB	.zip	14	177MB
.gif	681	63MB	.ppt	97	148MB			
.doc	160	60MB	.sys	501	80MB			
.docx	267	81MB	.wav	430	260MB			

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

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

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.

Benchmark 7 – Scan Time on Schedule

The data set used was a copy of the same files the **Scan Time on Demand** test (above) used, but the scan is started via a schedule from user interface. Where this option is not available the scan is scheduled from the management console (where possible).

Benchmark 8 – CPU Average during Scan

The CPUAvg tool is used for this metric. The system is clean booted and waits for idle (approximately 5 minutes after booting). A Virus Scan is run on a pre-defined set of files while CPUAvg is run for the duration of the scan.

Benchmark 9 – Browse Time

We used a script in conjunction with ***HTTPWatch*** *(Basic Edition, version 6.1)* to record the amount of time it takes for a set of 106 'popular' websites to load consecutively from a local server. This script feeds a list of URLs into ***HTTPWatch***, which instructs the browser to load pages in sequence and monitors the amount of time it takes for the browser to load all items on one page.

For this test, we have used ***Internet Explorer 8*** *(Version 8.0.6001.18783)* as our browser.

The set of websites used in this test include front pages of high traffic pages. This includes shopping, social, news, finance and reference websites.

The Browse Time test is executed five times and our final result is an average of these five samples. The local server is restarted between different products and one initial 'test' run is conducted

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 2008 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	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 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.

Benchmarks 11 – 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 809 files over 683,410,115 bytes and can be categorized as documents [28% of total], media files [60% of total] and PE files (i.e. System Files) [12% of total].

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 12 – File Compress and Decompress

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 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 13 – Memory Usage during System Idle

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. The first sample taken at boot is discarded.

The ***PerfLog++*** utility records memory usage of all processes, not just those of the anti-malware product. As a result of this, an anti-malware product's processes needed to be isolated from all other running system processes. To isolate relevant process, we used a program called ***Process Explorer*** which was run immediately upon the completion of memory usage logging by ***PerfLog++***. ***Process Explorer*** is a Microsoft Windows Sysinternals software tool which shows a list of all DLL processes currently loaded on the system.

Benchmark 14 – CPU Average during Idle

The CPUAvg tool is used for this. The system is clean booted and waits for idle (approximately 5 minutes after booting), CPUAvg is then run for 5 minutes while the system is in an idle state.

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