

Anti-Virus Comparative



Performance Test (Suite Products)

Impact of Internet Security Suites on System Performance

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Introduction

We want to make clear that the results in this report are intended to give only an indication of the impact on system performance (mainly by the real-time/on-access components) of the various Internet security suite products in these specific tests. Users are encouraged to try out the software on their own PCs and form an opinion based on their own observations.

Tested products

The following products were evaluated (with default settings) in this test in May 2012¹:

AhnLab V3 Internet Security 8.0	Kaspersky Internet Security 2012
Avast! Internet Security 7.0	McAfee Internet Security 2012
AVG Internet Security 2012	Panda Internet Security 2012
AVIRA Internet Security 2012	PC Tools Internet Security 2012
Bitdefender Internet Security 2012	Qihoo 360 Security 3.0
ESET Smart Security 5.0	Sophos Endpoint Security 10.0
F-Secure Internet Security 2012	Tencent QQ PC Manager 6.6
Fortinet FortiClient Lite Premium 4.2	Trend Micro Titanium Internet Security 2012
G DATA Internet Security 2013	Webroot SecureAnywhere Complete 2012
GFI Vipre Internet Security 2012	

Please note that the results in this report apply only to the products/versions listed above (e.g. 64-bit versions, product version, default settings, etc.). Also, keep in mind that different vendors offer different (and differing quantities of) features in their products.

The following activities/tests were performed on an up-to-date 64-bit Windows 7 Home Premium SP1 system:

- File copying
- Archiving / Unarchiving
- Encoding/Transcoding
- Installing/Uninstalling applications
- Launching applications
- Downloading files
- PC Mark 7 Professional Testing Suite

¹ We used the latest available product versions available at time of testing.

Test methods

The tests were performed on an Intel Core i7 920 machine with 4GB of RAM and SATA II hard disks. The performance tests were done on a clean Windows 7 Home Premium SP1 64 Bit system and then with the installed security software (with default settings). The tests were done with an active Internet connection to simulate real-world impact of cloud services/features.

The hard disks were defragmented before starting the various tests, and care was taken to minimize other factors that could influence the measurements and/or comparability of the systems. Optimizing processes/fingerprinting used by the products were also considered – this means that the results represent the impact on a system which has already been used by the user for a while. The tests were repeated several times (with and without fingerprinting) in order to get mean values and filter out measurement errors. After each run the workstation was defragmented and rebooted. We simulated various file operations that a computer user would execute: copying² different types of clean files from one place to another, archiving and unarchiving files, encoding and transcoding³ audio and video files, converting DVD files to iPod format, downloading files from the Internet, launching applications, etc. We also used a third-party industry-recognized performance testing suite (PC Mark 7 Professional) to measure the system impact during real-world product usage. Readers are invited to evaluate the various products themselves, to see how they impact on their systems (such as software conflicts and/or user preferences, as well as different system configurations that may lead to varying results).

Security products need to load on systems at an early stage to provide security from the very beginning – this load has some impact on the time needed for a system to start up. Measuring boot times accurately is challenging. The most significant issue is to define exactly when the system is fully started, as many operating environments may continue to perform start-up activities for some time after the system appears responsive to the user. It is also important to consider when the protection provided by the security solution being tested is fully active, as this could be a useful measure of boot completion as far as the security solution is concerned. Some anti-virus products load their services very late in the boot process (or even minutes after it). Users may notice that some time after the system loaded, the system gets very slow for some moments, so the system appears to load very fast, but only because it starts its services later and makes the system also insecure/vulnerable. As we do not want to support such activities, we still do not measure boot times.

To support our concerns, we tested whether the products load all their protection modules before e.g. malware in the start-up folder is executed. Most products failed this test, except AhnLab, Avast, AVG, Bitdefender, Panda, Sophos and Webroot. Only those products detected and blocked the malware before its execution after system start-up (by loading itself at an early stage). In all other cases the malware was successfully executed first and only later detected by the security suites, when the system was already compromised. In some cases only, the boot process for those products took marginally longer than for the products which loaded their modules later.

² We used 4GB data of various file categories (pictures, movies, audio files, various MS Office documents, PDF files, applications/executables, Microsoft Windows 7 system files, archives, etc.).

³ Converting MP3 files to WAV, MP3 to WMA, AVI to MPG and MPG to AVI, as well as iPod format

Notes and comments

The on-access/real-time scanner component of anti-virus software runs as a background process to check all files that are accessed, in order to protect the system continuously against malware threats. For example, on-access scanners scan files as soon as they are accessed, while (e.g.) behaviour-blockers add a different layer of protection and monitor what the file does when it is already executed/running. The services and processes that run in the background to carry out these tasks also require and use system resources. Suite products usually have a higher impact on system performance than anti-virus-only products, as more services/features are included and running in the background.

Security products need to be active deep in the system in order to protect it and e.g. to scan processes and so on that are already active during the system start-up, in order to identify rootkits and other malware. Those procedures add some extra time and thus a delay in system boot/start up.

If a product takes up too many system resources, users get annoyed and may either disable or uninstall some essential protective features (and considerably compromise the security of their system) or may switch to security software that is less resource-hungry. Therefore, it is important not only that anti-virus software provides high detection rates and good protection against malware, but also that it does not degrade system performance or trouble users.

While this report looks at how much impact various Internet security products have on system performance, it is not always just the security software which is the main factor responsible for a slow system. Other factors also play a role, and if users follow some simple rules, system performance can be improved noticeably. The next sections address some of the other factors that may play a part.

A few common problems observed on some user PCs:

- **Old hardware:** If a PC already runs at a snail's pace because it has ten-year-old hardware, using modern (security) software may make it unusable.
 - o If possible, buy a new PC that at least meets the minimum recommended requirements of the software you want to use. Multi-Core processors are preferable.
 - o Adding more RAM does not hurt. If you use Windows XP or Windows 7, you should use a minimum of 2GB of RAM. If you use Vista switch to Windows 7. 64-Bit systems are preferable, as especially software which is optimized for such systems will run faster.
 - o Make sure you have only ONE anti-virus program with real-time protection. If your new PC came with a trial anti-virus program, remove this before installing a different AV program.

- **Keep all your software up-to-date:** Using an anti-virus version from e.g. 2010 does not protect you as well as the newer version would, even though you may still be able to update the signatures. Please visit <http://update.microsoft.com> regularly and keep your operating system up-to-date by installing the recommended patches. Any software can have vulnerabilities and bugs, so keep all the software installed on your PC up-to-date: this will not only protect you against many exploits and vulnerabilities, but also give you any other application improvements that have been introduced.

- **Clean up the content of your hard disk:**
 - o If your hard disk is almost full, your system performance will suffer accordingly. Leave at least 20% of your disk space free; if necessary, move your movies and other infrequently accessed files to another (external) disk. If money is not an issue, consider buying solid state drives (SSDs).
 - o Uninstall unneeded software. Often, the slowdown that users notice after installing an anti-virus product is due to other software on the PC running in the background (that is, due to software conflicts or heavy file access by other programs, each access requiring anti-virus scanning).
 - o Remove unneeded shortcuts from the Startup folder in the Start Menu, and disable auto-start registry entries using msconfig.exe.
 - o If your PC is already messed up by residual files and registry entries left over by hundreds of applications you installed and uninstalled after trying them out over the past years, reformat the drive and reinstall a clean operating system, adding only software you really need (fewer programs means fewer potential vulnerabilities and conflicts, and so on) and use e.g. an image backup tool in order to ensure that you do not have to reinstall everything manually in future.

- **Defragment your hard disks regularly:** A fragmented hard disk can have a very big impact on system performance as well as considerably increasing the time needed to boot up the system.

- **Fingerprinting/Optimization:** most anti-virus products use various technologies to decrease their impact on system performance. Fingerprinting is such a technology, where already scanned files do not get rescanned again for a while (or more rarely) or are whitelisted. This increases the speed considerably (esp. after the PC has been used for some time), but also adds some little potential risk, as not all files are scanned anymore. It is up to the user to decide what to select. We suggest regularly performing a full-system scan (to be sure that all files are at least currently found as clean and to further optimize the fingerprinting).

- **Be patient:** a delay of a few additional seconds due to anti-virus is not necessarily a big deal. However, if even with the suggestions above the performance of your PC still annoys you, for instance, after you have installed the anti-virus you should consider trying out another anti-virus product. (If you only notice a slow-down after using the anti-virus for a long time, there are probably other factors behind the slowdown). Never reduce your security by disabling essential protection features, just in the hope of gaining a slightly faster PC!

Test cases

File copying

Some anti-virus products do not scan all kind of files by design/default (e.g. based on their file extensions), or use fingerprinting technologies, which may skip already scanned files in order to increase the speed (see comments on page 6). We copied a set of different file types which are widespread at home and office workstations from one physical hard disk to another physical hard disk.

Archiving and unarchiving

Archives are commonly used for file storage, and the impact of anti-virus software on the time taken to create new archives or to decompress files from existing archives may be of interest for most users. We compressed a set of different file types which are widespread at home and office workstations from one physical hard disk to another physical hard disk, and unzipped them after this onto a third physical hard disk. The results already consider the fingerprinting/optimization technologies of the anti-virus products, as most users usually make archives of files they have on their disk.

Encoding/transcoding

Music files are often stored and converted on home systems, and converting such files takes system resources. Because of this, many home users may be interested to know if their anti-virus product imposes a slowdown while converting multimedia files from one format to another. We encoded and transcoded some multimedia files with FFmpeg, and for the iPod conversion we used HandBrakeCLI. The impact during FFmpeg and iPod converting was almost the same. All products were “very fast” in this test.

Installing/uninstalling applications

We installed several programs (like e.g. Visual C++, .NET Framework, etc.) with MSI installers, and then uninstalled them and measured how long it took. We did not consider fingerprinting, because usually an application is only installed once.

Launching applications

Office document files and PDF files are very common. We opened some large document files in Microsoft Office (and closed it) and some large PDF files in Adobe Acrobat Reader (and closed it). Before each opening, the workstation was rebooted. The time taken for the viewer or editor application to open and a document to be displayed was measured. Although we list the results for the first opening and the subsequent openings, we consider the subsequent openings more important, as normally this operation is done several times by users, and optimization features of the anti-virus products take place, minimizing their impact on the systems.

Downloading files

Files are commonly downloaded from the Internet. Nearly all products were “very fast” in this test.

Test results

These specific test results show the impact on system performance that each individual Internet security suite product has, compared to the others. The reported data just give an indication and are not necessarily applicable in all circumstances, as too many factors can play an additional part. As we noticed that delivering percentages gets easily misinterpreted by users (as well as misused by marketing departments or the press), and percentages would need adjustments when other hardware specifications are being used, we grouped the results by clustering them. The impact within those categories does not statistically differ, also considering error measurements. The categories were defined by the testers by consulting statistical methods like hierarchal clustering and taking into consideration what would be noticed from user's perspective or compared to the impact of the other security products.

Overview of single AV-C performance scores

Vendor	File copying		Archiving/ unarchiving	Encoding/ transcoding	Installing/ uninstalling applications	Launching applications				Downloading files
	On first run	On subsequent runs				Open Word		Open PDF		
						On first run	On subsequent runs	On first run	On subsequent runs	
AhnLab										
Avast										
AVG										
AVIRA										
Bitdefender										
BullGuard										
eScan										
ESET										
F-Secure										
Fortinet										
G DATA										
GFI										
Kaspersky										
McAfee										
Panda										
PC Tools										
Qihoo										
Sophos										
Tencent										
Trend Micro										
Webroot										

Key: slow mediocre fast very fast



PC Mark Tests

In order to provide an industry-recognized performance test, we used the PC Mark 7 Professional Edition⁴ testing suite. Users using PC Mark 7 should take care to minimize all external factors which could affect the testing suite and follow strictly at least the considerations/suggestions documented inside the PC Mark manual, in order to get consistent and valid/useful results. Furthermore, the tests should be repeated several times to verify them. For more information about the various consumer scenarios tests included in PC Mark, please read the whitepaper on their website⁵.

“Without AV” is tested on a baseline⁶ system which scores 100 points in the PC Mark test.

	PC Mark points
<i>without AV</i>	100,0
Webroot	99,8
Avast	99,7
ESET	99,6
Sophos	99,4
AVIRA	99,4
Qihoo	99,2
Tencent	99,1
F-Secure	98,8
Panda	98,8
Bitdefender	98,6
Kaspersky	98,6
AVG	98,5
eScan	98,1
AhnLab	98,0
Fortinet	98,0
GFI	98,0
G DATA	98,0
McAfee	97,8
Trend Micro	96,7
BullGuard	96,3
PC Tools	96,1

⁴ For more information, see <http://www.pcmark.com/benchmarks/pcmark7/>

⁵ http://www.pcmark.com/wp-content/uploads/2011/05/PCMark7_Whitepaper.pdf (PDF)

⁶ Baseline system: Intel Core i7 920 machine with 4GB of RAM, ATI Radeon HD4500 (512 MB)

Summarized results

Users should weight the various subtests according to their needs. We applied a scoring system in order to sum up the various results.

For “file copying” we took the mean values (and rounded them up), as well as for “launching applications” (on subsequent runs). Like in previous performance reports, “very fast” gets 15 points, “fast” gets 10 points, “mediocre” gets 5 points and “slow” gets zero points. This leads to the following results:

	AV-C Score	PC Mark Score	TOTAL
Webroot	88	99,8	187,8
Avast	88	99,7	187,7
ESET	88	99,6	187,6
AVIRA	88	99,4	187,4
Sophos	88	99,4	187,4
Qihoo	88	99,2	187,2
Tencent	88	99,1	187,1
F-Secure	88	98,8	186,8
Panda	88	98,8	186,8
Bitdefender	88	98,6	186,6
Kaspersky	88	98,6	186,6
AVG	88	98,5	186,5
eScan	85	98,1	184,1
AhnLab	83	98,0	181,0
McAfee	83	97,8	180,8
GFI	78	98,0	176,0
Trend Micro	78	96,7	174,7
BullGuard	78	96,3	174,3
G DATA	76	98,0	174,0
Fortinet	63	98,0	161,0
PC Tools	63	96,1	159,1

Award levels reached in this test

The following award levels are for the results reached in this performance test report. Please note that the performance test only tells you how much impact an Internet security suite product may have on a system compared to other Internet Security Suite products; it does not tell you anything about the effectiveness of the protection a product provides.

AWARDS	PRODUCTS ⁷
	<ul style="list-style-type: none"> ✓ Webroot ✓ Avast ✓ ESET ✓ AVIRA ✓ Sophos ✓ Qihoo ✓ Tencent ✓ F-Secure ✓ Panda ✓ Bitdefender ✓ Kaspersky ✓ AVG
	<ul style="list-style-type: none"> ✓ eScan ✓ AhnLab ✓ McAfee ✓ GFI ✓ Trend Micro ✓ BullGuard ✓ G DATA
	<ul style="list-style-type: none"> ✓ Fortinet ✓ PC Tools

The above awards have been given based on our assessment of the overall impact results with default settings on an up-to-date Windows 7 Home Premium SP1 64 Bit system.

⁷ We suggest considering all products with the same award to be as good as each other.

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