Anti-Virus Comparative

Performance test (Suite Products)

Impact of 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 Security suites in these specific tests. Users are encouraged to try out the software on their own PC's and form an opinion based on their own observations.

A performance test including Anti-Virus products[1] (not Internet Security suites) will be released in some months.

Tested products

The following products were evaluated (with default settings) in this test (July 2011)[2]:

- avast! Internet Security 6.0
- AVG Internet Security 10.0
- AVIRA Premium Security Suite 10.0
- BitDefender Internet Security 2012 (RTM)
- ESET Smart Security 4.2
- F-Secure Internet Security 2011
- G DATA Internet Security 2012
- K7 TotalSecurity 11.1
- Kaspersky Internet Security 2012
- McAfee Internet Security 2011
- Panda Internet Security 2012
- PC Tools Internet Security 2011
- Qihoo 360 2011
- Sophos Endpoint Security 9.7
- Symantec Norton Internet Security 2012 (RTM)
- Trend Micro Titanium Internet Security 2012 (RTM)
- Webroot Internet Security Complete 7.0

Please note that the results in this report apply only to the products/versions listed above (e.g. 64-Bit versions, Internet Security version [not e.g. AV version], etc.). Also, keep in mind that different vendors offer different (and differing quantities of) features in their products.

The following activities/tests were performed under Windows 7 Home Premium SP1 64-Bit:

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

[1] Microsoft Security Essentials is not included in the report because it is not an Internet Security Suite. It will be included in the performance test report which will cover Anti-Virus products. eScan and Trustport will also be included in the next performance report (which will be released in some months).

[2] We used the latest available product versions available at time of testing; final/RTM (Release-To-Manufacturer) versions were allowed.

Test methods

The tests were performed on an Intel Core 2 Duo E6400 machine with 2GB of RAM and SATAII hard disks. The performance tests were done on a clean Windows 7 Home Premium SP1 64 Bit system (English) and then with the installed Internet Security software (with default settings). The tests have been done with an active internet connection to simulate real world impact of cloud services (and eventual cloud-whitelisting).

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: copying[3] different types of clean files from one place to another, archiving and unarchiving files, encoding and transcoding[4] audio and video files, converting DVD-Files to IPOD format, downloading files from 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 are loading their services very late (even minutes later) at boot (users may notice that after some time that the system loaded, the system gets very slow for some moments), so the system looks like loading very fast, but it just loads 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 proof our concerns, we tested (like last year) on an older system if the products are loading all their protection modules before e.g. malware in the start-up folder is executed (this can happen e.g. if malware is dropped and loaded only after reboot). Some few products indeed improved and fixed this admitted "bug", but the majority still fails in this test (probably "by design" of their default settings, as some users give more importance to performance than to security). Only AVG, Bitdefender, Sophos and Webroot detected and blocked the malware before its execution after system start-up (by loading itself by default at an early stage). In all others cases first the malware was successfully executed and only later detected by the AV products (which took longer to load all its protection modules), when it would be already too late.

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

[4] Converting MP3 files to WAV, MP3 to WMA, AVI to MPG and MPG to AVI, as well as iPod format

Side 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 do these tasks also require and use system resources. Suite products have usually 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, 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.
  - 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.
  - 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.
  - 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. 2009 does not protect you as well as the newer version would, even though you may still be able to update the signatures. 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**:
  - If your hard disk is almost full, your system performance will suffer accordingly. Leave at least 20% of your disk space free and move your movies and other infrequently accessed files to another (external) disk. If money is not an issue, consider buying solid state drives (SSDs).
  - 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).
  - Remove unneeded entries/shortcuts from the Autostart/start-up folder in the program menu
  - 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, re-install a clean operating system and install only software you really need (fewer software installations, 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 some time the PC was used), but also adds some little potential risk, as not all files are scanned anymore. It is up to the user to decide what to prefer. We suggest performing regularly 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 your PC still needs a considerably longer time to boot up, 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). Do not reduce your security by disabling essential protection features, just in the hope of gaining a slightly faster PC.

Test results

These specific test results show the impact on system performance that Internet Security products have, compared to the other tested Internet Security products. 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 of AV vendors), we grouped the results in four categories, as the impact within those categories can be considered almost equal, also considering error measurements. The categories were defined by the testers, based on what would be noticed from user's perspective or compared to the impact of other security products. As we tested this time only under Windows 7, we applied stricter categories to show differences.

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.

+0% to +10%	very fast
+10% to +30%	fast
+30% to +90%	mediocre
over +90%	slow

	On first run	On subsequent runs (with fingerprinting, if available)
Avast	fast	very fast
AVG	fast	very fast
AVIRA	fast	very fast
Bitdefender	fast	very fast
ESET	very fast	very fast
F-Secure	fast	very fast
G DATA	very fast	very fast
Kaspersky	very fast	very fast
K7	very fast	very fast
McAfee	mediocre	fast
Panda	very fast	very fast
PC Tools	slow	fast
Qihoo	mediocre	very fast
Sophos	fast	very fast
Symantec	very fast	very fast
Trend Micro	fast	fast
Webroot	fast	very fast

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 unarchive files from existing archives may be of interest for most users.

We archived a set of different file types which are widespread at home and office workstations form one physical hard disk to another physical hard disk and unzipped them after this again on a third physical hard disk.

The results below already consider the fingerprinting/optimization technologies of the Anti-Virus products, as most users usually make archives of files they have on their disk.

+0% to +15%	very fast
+15% to +30%	fast
+30% to +50%	mediocre
over +50%	slow

Avast	very fast
AVG	very fast
AVIRA	very fast
Bitdefender	very fast
ESET	very fast
F-Secure	very fast
G DATA	fast
K7	very fast
Kaspersky	very fast
McAfee	very fast
Panda	very fast
PC Tools	mediocre
Qihoo	fast
Sophos	very fast
Symantec	very fast
Trend Micro	fast
Webroot	mediocre

Encoding/transcoding

Music files are often stored and converted on home systems, and converting such files takes system resources. Due that, 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.

+0 to +5%	very fast
+5 to +10%	fast
+10 to +20%	mediocre
over +20%	slow

Avast	very fast
AVG	very fast
AVIRA	very fast
Bitdefender	fast
ESET	very fast
F-Secure	very fast
G DATA	fast
K7	very fast
Kaspersky	very fast
McAfee	very fast
Panda	fast
PC Tools	very fast
Qihoo	very fast
Sophos	very fast
Symantec	very fast
Trend Micro	very fast
Webroot	fast

Installing/uninstalling applications

We installed several programs (like 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.

+0% to +10%	very fast
+10% to +20%	fast
+20% to +30%	mediocre
over +30%	slow

Avast	very fast
AVG	very fast
AVIRA	very fast
Bitdefender	very fast
ESET	very fast
F-Secure	very fast
G DATA	fast
K7	very fast
Kaspersky	fast
McAfee	very fast
Panda	very fast
PC Tools	mediocre
Qihoo	very fast
Sophos	very fast
Symantec	very fast
Trend Micro	very fast
Webroot	mediocre

Downloading files from the Internet

Files are commonly downloaded from the internet. All products were “very fast” (< +5%) in this test.

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.

+0% to +10% very fast
+10% to +25% fast
+25% to +50% mediocre
over +50% slow

	Open Word		Open PDF	
	On first run	**On subsequent runs (with fingerprinting, if available)**	**On first run**	**On subsequent runs (with fingerprinting, if available)**
Avast	mediocre	**fast**	very fast	**very fast**
AVG	fast	**very fast**	very fast	**very fast**
AVIRA	very fast	**very fast**	very fast	**very fast**
Bitdefender	fast	**very fast**	very fast	**very fast**
ESET	very fast	**very fast**	very fast	**very fast**
F-Secure	fast	**fast**	very fast	**very fast**
G DATA	mediocre	**very fast**	fast	**very fast**
K7	very fast	**very fast**	mediocre	**fast**
Kaspersky	mediocre	**very fast**	mediocre	**very fast**
McAfee	fast	**fast**	mediocre	**very fast**
Panda	very fast	**very fast**	very fast	**very fast**
PC Tools	mediocre	**fast**	mediocre	**very fast**
Qihoo	mediocre	**fast**	very fast	**very fast**
Sophos	fast	**very fast**	very fast	**very fast**
Symantec	fast	**very fast**	very fast	**very fast**
Trend Micro	fast	**very fast**	very fast	**very fast**
Webroot	very fast	**very fast**	very fast	**very fast**

PC Mark Tests

In order to provide an industry-recognized performance test, we used the PC Mark 7 Professional Edition[5] 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 website[6].

	PC Mark score	Points
without IS	*1640*[7]	-
K7	**1633**	**99,6**
F-Secure	**1622**	**98,9**
Symantec	**1612**	**98,3**
ESET	**1611**	**98,2**
Sophos	**1608**	**98,0**
Avast	**1604**	**97,8**
AVIRA	**1601**	**97,6**
Kaspersky	**1600**	**97,6**
AVG, Panda	**1599**	**97,5**
Trend Micro	**1597**	**97,4**
Bitdefender	**1593**	**97,1**
Qihoo	**1585**	**96,6**
McAfee	**1584**	**96,6**
Webroot	**1583**	**96,5**
G DATA	**1582**	**96,5**
PC Tools	**1576**	**96,1**

[5] For more information, see http://www.pcmark.com/benchmarks/pcmark7/
[6] http://www.pcmark.com/wp-content/uploads/2011/05/PCMark7_Whitepaper.pdf (PDF)
[7] Baseline system: Intel Core 2 Duo 6400 (2.13 GHz) machine with 2GB of RAM and NVIDIA GeForce GT 520

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, 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
Symantec	90	98,3	**188,3**
ESET	90	98,2	**188,2**
K7	87,5	99,6	**187,1**
Sophos	87,5	98,0	**185,5**
AVIRA	87,5	97,6	**185,1**
AVG	87,5	97,5	**185,0**
F-Secure	85	98,9	**183,9**
Avast	85	97,8	**182,8**
Kaspersky	85	97,6	**182,6**
Panda	85	97,5	**182,5**
Bitdefender	82,5	97,1	**179,6**
Trend Micro	80	97,4	**177,4**
McAfee	80	96,6	**176,6**
Qihoo	77,5	96,6	**174,1**
G DATA	75	96,5	**171,5**
Webroot	62,5	96,5	**159,0**
PC Tools	57,5	96,1	**153,6**

Certification levels reached in this test

We provide a 4-level ranking system: Tested, STANDARD, ADVANCED and ADVANCED+. All products were quite good, and reached at least the STANDARD level.

The following certification 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 product may have on a system compared to other Internet Security products; it does not tell you anything about the effectiveness of the protection a product provides.

CERTIFICATION LEVELS	PRODUCTS[8]
	✓ Symantec ✓ ESET ✓ K7 ✓ Sophos ✓ AVIRA ✓ AVG ✓ F-Secure ✓ Avast ✓ Kaspersky ✓ Panda
	✓ Bitdefender ✓ Trend Micro ✓ McAfee ✓ Qihoo ✓ G DATA
	✓ Webroot ✓ PC Tools

The above awards have been given based on our assessment of the overall impact results with default settings under Windows 7 Home Premium SP1 64 Bit.

[8] We suggest considering products with the same award to be as good as the other products with same award.

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