

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.

This test contains fewer tested products than usual as it is an additional test in which vendors agreed to take part. The performance test including all the 20 Anti-Virus products (not suites) will be done/released later this year.

Tested products

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

avast! Internet Security 5.0	Kaspersky Internet Security 2011
AVG Internet Security 9.0	Kingsoft Internet Security 2010
BitDefender Internet Security 2010	Norman Security Suite Pro 8
eScan Internet Security Suite 10	Panda Internet Security 2011
ESET Smart Security 4.2	PC Tools Internet Security 2011
F-Secure Internet Security 2011	Symantec Norton Internet Security 2011
G DATA Internet Security 2011	Trend Micro Internet Security Pro 2010

Please note that the results in this report apply only to the products/versions listed above and should not be assumed comparable to (e.g.) the versions provided by the above listed vendors as part of a product suite. 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 XP and Windows 7:

- File copying
- Archiving / Unarchiving
- Encoding / Transcoding
- Installing / Uninstalling applications
- Launching applications
- Downloading files
- Worldbench Testing Suite (XP)

Test methods

The tests were performed on an Intel Core 2 Duo E8300 machine with 2GB of RAM and SATAII hard disks. The performance tests were first done on a clean Windows XP Professional SP3 system (English) and then with the installed Internet Security software (with default settings). This report contains also results based on Windows 7 Professional.

The hard disk was 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 (network, temperature, etc.). 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: copying¹ different types of clean files from one place to another, archiving and unarchiving files, encoding and transcoding² 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 (Worldbench 6) 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).

We did not test boot-times on purpose. 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. To test this is almost impossible. Some vendors let the user choose if he wants a safe or fast start. We recommend to use the safe start, the user will only lose a few seconds but get more security. Furthermore, some security 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, and considering that in most cases a workstation is powered on only once a day, we decided to do not measure boot times.

¹ We used 2GB data of various file categories (pictures, movies, music, various MS Office 2003 and 2007 documents, PDF files, applications/executables, operating system files, archives, etc.).

² 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 (Anti-Virus) 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.
 - 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.
 - 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.
- **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.
 - 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.
- **Keep all your software up-to-date:** Using an Anti-Virus version from 2008 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.
- **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 to perform 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 felt/noticed from user's perspective (e.g. "slow" means that the user would notice and label the added slowdown as too high, also compared to the impact of other security products).

File copying

Some Anti-Virus products do not scan all kind of files by design/default (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 +25%	very fast
+25% to +50%	fast
+50% to +100%	mediocre
over +100%	slow

	Windows XP		Windows 7	
	On first run	On subsequent runs (with fingerprinting, if available)	On first run	On subsequent runs (with fingerprinting, if available)
Avast	fast	very fast	very fast	very fast
AVG	fast	very fast	fast	very fast
Bitdefender	fast	fast	mediocre	fast
eScan	mediocre	fast	mediocre	fast
ESET	fast	very fast	fast	fast
F-Secure	mediocre	very fast	fast	very fast
G DATA	slow	very fast	mediocre	fast
Kaspersky	mediocre	fast	fast	very fast
Kingsoft	fast	very fast	fast	fast
Norman	fast	very fast	mediocre	mediocre
Panda	fast	very fast	mediocre	fast
PC Tools	fast	very fast	fast	very fast
Symantec	fast	very fast	fast	fast
Trend Micro	mediocre	mediocre	mediocre	mediocre

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 from 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 +20%	very fast
+20% to +40%	fast
+40% to +80%	mediocre
over +80%	slow

	Windows XP	Windows 7
Avast	very fast	very fast
AVG	very fast	very fast
Bitdefender	very fast	very fast
eScan	very fast	very fast
ESET	very fast	very fast
F-Secure	fast	very fast
G DATA	very fast	very fast
Kaspersky	fast	very fast
Kingsoft	very fast	very fast
Norman	very fast	very fast
Panda	very fast	very fast
PC Tools	fast	very fast
Symantec	fast	very fast
Trend Micro	fast	very fast

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

	Windows XP	Windows 7
Avast	very fast	very fast
AVG	very fast	very fast
Bitdefender	very fast	very fast
eScan	very fast	very fast
ESET	very fast	very fast
F-Secure	very fast	very fast
G DATA	very fast	very fast
Kaspersky	very fast	very fast
Kingsoft	very fast	very fast
Norman	very fast	very fast
Panda	very fast	very fast
PC Tools	very fast	very fast
Symantec	very fast	very fast
Trend Micro	very fast	very fast

All tested Internet Security products added less than 15% slowdown (very fast) to the process and would add almost unnoticeable impact while encoding/transcoding normal multimedia files.

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 +25%	very fast
+25% to +50%	fast
+50% to +100%	mediocre
over +100%	slow

	Windows XP	Windows 7
Avast	very fast	very fast
AVG	very fast	very fast
Bitdefender	mediocre	very fast
eScan	very fast	very fast
ESET	fast	very fast
F-Secure	very fast	very fast
G DATA	mediocre	very fast
Kaspersky	fast	very fast
Kingsoft	fast	very fast
Norman	very fast	very fast
Panda	very fast	very fast
PC Tools	fast	very fast
Symantec	fast	very fast
Trend Micro	very fast	very fast

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 +50%	very fast
+50% to +100%	fast
+100% to +200%	mediocre
over +200%	slow

Results Windows XP

	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	mediocre	mediocre	fast
AVG	mediocre	fast	mediocre	very fast
Bitdefender	mediocre	fast	fast	very fast
eScan	mediocre	fast	mediocre	mediocre
ESET	fast	very fast	mediocre	very fast
F-Secure	mediocre	very fast	fast	very fast
G DATA	mediocre	fast	slow	mediocre
Kaspersky	mediocre	fast	mediocre	fast
Kingsoft	very fast	very fast	very fast	very fast
Norman	mediocre	very fast	fast	fast
Panda	very fast	very fast	fast	very fast
PC Tools	slow	slow	slow	slow
Symantec	fast	very fast	fast	very fast
Trend Micro	slow	slow	slow	slow

Some optimization features may not take place in some products (or not reduce enough the impact), as documents and PDF files are common infection targets and therefore are anyway scanned when opened.

Results Windows 7

+0% to +50% very fast
 +50% to +100% fast
 +100% to +200% mediocre
 over +200% 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	very fast	very fast	very fast	very fast
AVG	very fast	very fast	very fast	very fast
Bitdefender	very fast	very fast	fast	very fast
eScan	fast	very fast	very fast	very fast
ESET	very fast	very fast	very fast	very fast
F-Secure	very fast	very fast	fast	very fast
G DATA	mediocre	very fast	fast	fast
Kaspersky	mediocre	fast	mediocre	fast
Kingsoft	very fast	very fast	very fast	very fast
PC Tools	fast	fast	fast	fast
Norman	mediocre	fast	mediocre	fast
Panda	very fast	very fast	very fast	very fast
Symantec	very fast	very fast	very fast	very fast
Trend Micro	fast	fast	mediocre	mediocre

Downloading files from the Internet

Files are commonly downloaded from the internet. To avoid external influences, we used an in-house Apache web server (wget) connected with 1GB LAN and measured the download time. We tested using large files/archives.

+0% to +25%	very fast
+25% to +50%	fast
+50% to +100%	mediocre
over +100%	slow

	Windows XP	Windows 7
Avast	fast	fast
AVG	mediocre	very fast
Bitdefender	fast	fast
eScan	very fast	very fast
ESET	mediocre	mediocre
F-Secure	mediocre	fast
G DATA	slow	slow
Kaspersky	mediocre	mediocre
Kingsoft	very fast	very fast
Norman	very fast	very fast
Panda	very fast	very fast
PC Tools	very fast	very fast
Symantec	very fast	very fast
Trend Micro	mediocre	fast

WorldBench Tests

In order to provide an industry-recognized performance test, we used the WorldBench³ testing suite of PCWorld. WorldBench⁶ is a leading application-based real-world performance benchmark.

Popular applications are each a component of the final WorldBench score. The WorldBench score (higher is better) is compared against a baseline⁴ system. Below you can see the reached Worldbench scores.

	WB score
<i>without AV</i>	<i>115</i>
Panda	104
eScan	103
ESET	103
F-Secure	103
Kingsoft	102
Symantec	101
Avast	100
G DATA	98
Kaspersky	97
AVG	96
Norman	95
PC Tools	94
BitDefender	91
Trend Micro	90

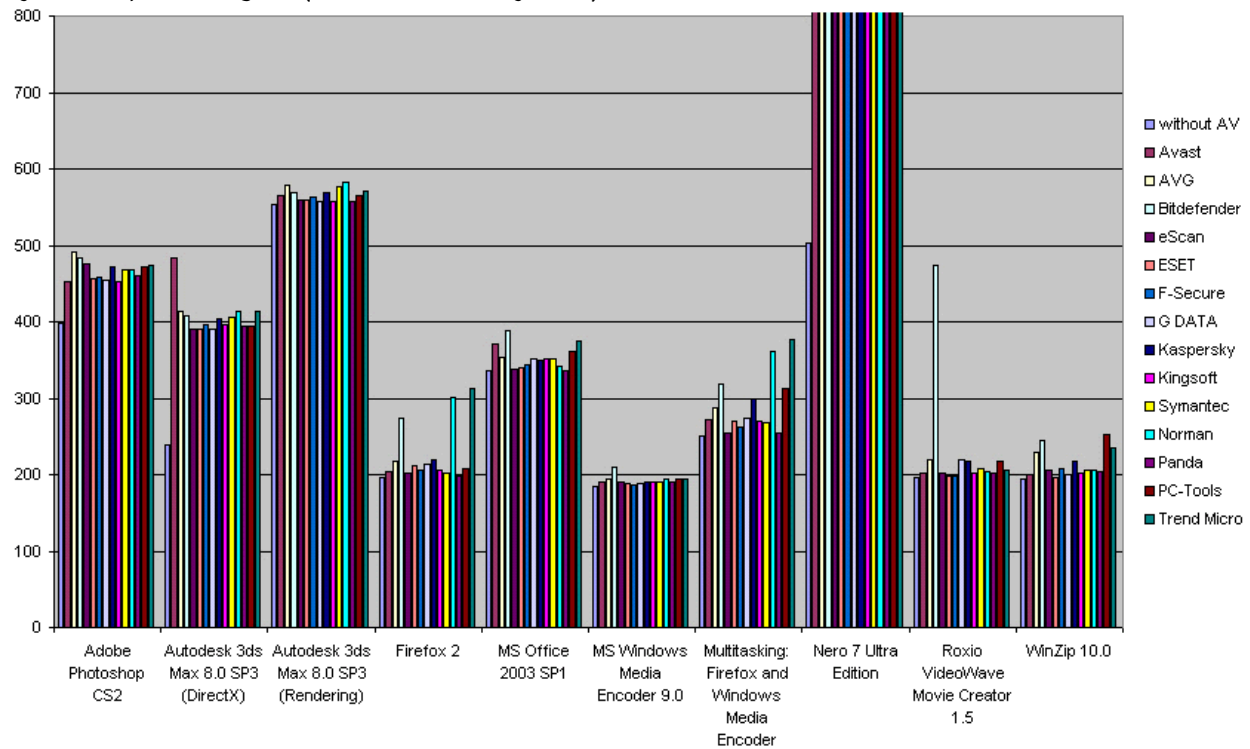
The WorldBench testing Suite consists of the following ten tests, simulating real-world usage: Adobe Photoshop CS2, Autodesk 3ds Max 8.0 SP3 (DirectX), Autodesk 3ds Max 8.0 SP3 (Rendering), Mozilla Firefox 2, Microsoft Office 2003 with SP1, Microsoft Windows Media Encoder 9.0, Multitasking: Mozilla Firefox and Windows Media Encoder, Nero 7 Ultra Edition, Roxio VideoWave Movie Creator 1.5 and WinZip 10.0.

The WorldBench Test under Windows 7 has not been included in this report due compatibility issues.

³ For more information, see <http://www.worldbench.com> or <http://en.wikipedia.org/wiki/WorldBench>

⁴ The Worldbench baseline system (score 100) is an Intel Core 2 Duo E6600, with 2GB RAM. The AV-Comparatives baseline system is an Intel Core 2 Duo E8300, with 2GB of RAM.

Below you can see a graph showing the time needed (in seconds) by the various suite products in the various WorldBench6 tests (lower bars are better) under Windows XP SP3. As it can be seen, in most cases there is not much difference between the products, except in few cases, where the difference on system impact is higher (and can be clearly seen).



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.

XP	File copying (mean values)	Archiving/ unarchiving	Encoding/ transcoding	Installing/ uninstalling	Download	Launching applications	WorldBench	Total
Panda	very fast (13)	very fast (15)	very fast (15)	very fast (15)	very fast (15)	very fast (15)	104	192
Kingsoft	very fast (13)	very fast (15)	very fast (15)	fast (10)	very fast (15)	very fast (15)	102	185
Norman	very fast (13)	very fast (15)	very fast (15)	very fast (15)	very fast (15)	very fast (13)	95	181
eScan	fast (8)	very fast (15)	very fast (15)	very fast (15)	very fast (15)	fast (8)	103	179
Symantec	very fast (13)	fast (10)	very fast (15)	fast (10)	very fast (15)	very fast (15)	101	179
ESET	very fast (13)	very fast (15)	very fast (15)	fast (10)	mediocre (5)	very fast (15)	103	177
Avast	very fast (13)	very fast (15)	very fast (15)	very fast (15)	fast (10)	fast (8)	100	176
F-Secure	fast (10)	fast (10)	very fast (15)	very fast (15)	mediocre (5)	very fast (15)	103	173
AVG	very fast (13)	very fast (15)	very fast (15)	very fast (15)	mediocre (5)	very fast (13)	96	172
BitDefender	fast (10)	very fast (15)	very fast (15)	mediocre (5)	fast (10)	very fast (13)	91	159
PC TOOLS	very fast (13)	fast (10)	very fast (15)	fast (10)	very fast (15)	slow (0)	94	157
Kaspersky	fast (8)	fast (10)	very fast (15)	fast (10)	mediocre (5)	fast (10)	97	155
G DATA	fast (8)	very fast (15)	very fast (15)	mediocre (5)	slow (0)	fast (8)	98	149
Trend Micro	mediocre (5)	fast (10)	very fast (15)	very fast (15)	mediocre (5)	slow (0)	90	140

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 a security suite may have on a system compared to other security suites; it does not tell you anything about the effectiveness of the protection a product provides.

CERTIFICATION LEVELS	PRODUCTS ⁵
	<ul style="list-style-type: none"> ✓ Panda ✓ Kingsoft ✓ Norman ✓ Symantec ✓ eScan ✓ ESET ✓ Avast ✓ F-Secure ✓ AVG
	<ul style="list-style-type: none"> ✓ BitDefender ✓ PC Tools ✓ Kaspersky
	<ul style="list-style-type: none"> ✓ G DATA ✓ Trend Micro

The above awards have been given based on our assessment of the overall impact results with default settings under Windows XP.

⁵ We suggest to consider products with same the award to be as good as the other products with same award.

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