

Commissioned by
Microsoft

Microsoft-prevalence-based analysis of the File Detection Test



Supplementary Report to the File Detection Test of September 2013

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www.av-comparatives.org

Introduction

This report has been commissioned by Microsoft and is based on telemetry data provided by Microsoft. This is a first prototype customer-impact report; more enhanced versions might be provided for future File-Detection Test reports.

The essence of this report is as follows. Of the prevalent samples used in the malware-detection test, some will pose a greater threat to the average user than others as they are more widespread than others. Some may target e.g. a specific company or user base, but present less of risk to other users. Other malware samples may only be found on specific websites, affect specific countries/regions, or only be relevant to particular operating system versions or interface languages.

Microsoft's initiative uses its global telemetry data (malware prevalence) to consider the customer impact posed by missed detections. That is, the malware files that antimalware products failed to detect are weighted based on malware-family prevalence, and each vendor's prevalence-weighted results are reported along with the file-detection results in this report. These results are designed to give greater insight into the customer impact of the missed detections during testing. In addition to global prevalence weighting impact, geo-location prevalence is also used to determine the customer impact of missed detections in specific countries for products tested. This is used to present the file-detection efficacy of antimalware products in the test against prevalent malware samples.

This report is supplementary to AV-Comparatives' main report¹, already published, of the September 2013 File-Detection Test. No additional testing has been performed; rather, the existing test results have been re-analysed from a different perspective, to consider what impact the missed samples are likely to have on customers. It is conceivable that a product with a lower score in the test may actually protect the average user better than one with a higher score, under specific circumstances. Let us imagine that Product A detects 99% of malware samples in the test, but that the 1% of samples not detected are very widespread, and that the average user is quite likely to encounter them. Product B, on the other hand, only detects 98% of samples, but the samples missed are either not as prevalent, or only run on a specific operating system. In this case, users would probably be more at risk using Product A, as it misses more of the malware that is likely to present a threat to them.

AV-Comparatives has for many years focused on using prevalent samples in its tests, as mentioned in our reports and also in a Microsoft blog². Furthermore, same sample variants (e.g. polymorphic malware) are clustered to avoid a disproportional test-set³. AV-Comparatives makes use of telemetry data from various sources, not just Microsoft, as the test-set must remain independent and not based solely on data provided by one specific vendor or organisation. Therefore, minor discrepancies between one vendor's data and our independently sorted combination are possible. The original File-Detection Test in September 2013 used a malware set sorted using various telemetry sources; however, the analysis in this supplementary report is based solely on Microsoft's data.

¹ http://www.av-comparatives.org/wp-content/uploads/2013/09/avc_fdt_201309_en.pdf

² <http://blogs.technet.com/b/mmpc/archive/2010/06/15/update-on-telemetry-usage-in-tests-part-1.aspx>

³ <http://blogs.technet.com/b/mmpc/archive/2009/07/16/let-telemetry-be-your-guide-a-proposal-for-security-tests.aspx>

Tested products⁴:

Microsoft asked us to include in this analysis report only those products that are included in the public main-tests of 2014 as well as 2013. The following products tested⁵ in September 2013 are included in this report:

1. AhnLab V3 Internet Security 8.0
2. avast! Free Antivirus 8.0
3. AVG Anti-Virus 2014
4. AVIRA Antivirus Premium 13.0
5. Bitdefender Antivirus Plus 2014
6. BullGuard Antivirus 13.0
7. eScan Anti-Virus 14.0
8. Emsisoft Anti-Malware 8.1
9. ESET NOD32 Antivirus 6.0
10. F-Secure Anti-Virus 2014
11. Fortinet FortiClient 5.0
12. Kaspersky Anti-Virus 2014
13. Kingsoft Internet Security 2013
14. McAfee AntiVirus Plus 2014
15. Microsoft Security Essentials 4.3
16. Panda Cloud Free Antivirus 2.2.1
17. Qihoo 360 Internet Security 4.2
18. Sophos Anti-Virus 10.2
19. Tencent QQ PC Manager 8.1
20. ThreatTrack Vipre Antivirus 6.2
21. Trend Micro Titanium AntiVirus+ 2014

The test-set used was built consulting telemetry data from various sources (not only Microsoft), with the aim of including mainly prevalent malicious samples from the last weeks/months prior the test which posed a threat to users in the field.

Detection vs. Protection

Although very important, the file-detection rate of a product is only one aspect of a complete anti-virus product. Almost all antivirus products contain features such as URL-blockers and behavioural protection that protect the user's computer without necessarily identifying every malicious file.

AV-Comparatives also provides a whole-product dynamic "real-world" protection test⁶, as well as other test reports that cover these aspects/features of the products. We invite users to look at our other tests and not only the File-Detection Test, even though a good file-detection rate is still one of the most important, deterministic and reliable basic features of an anti-virus product.

⁴ Information about additional third-party engines/signatures used inside the products: **BullGuard**, **Emsisoft**, **eScan**, **F-Secure** and **Qihoo** were based on the Bitdefender engine. **Kingsoft** and **Tencent** were based on the AVIRA engine.

⁵ http://www.av-comparatives.org/wp-content/uploads/2013/09/avc_fdt_201309_en.pdf

⁶ <http://www.av-comparatives.org/dynamic-tests/>

Methodology

This analysis was carried out using AV-Comparatives' file-detection test data from September 2013. Telemetry data was gathered for the files in the test over the period between July 1 and December 31 2013. This telemetry came from Microsoft real-time protection (RTP) products and included not only threat telemetry but also behaviour-based early warning telemetry. Only computers whose users have agreed to provide data to Microsoft are considered when calculating encounter rates.

This data was used to generate a weighting to represent customer impact for the files used in the test. This weighting was generated by first counting the total number of distinct computers identified through a unique product GUID (not IP address) that encountered the malware files in the test. Furthermore, a weighting for the malware family associated with the specific files in the test was generated from computers running Microsoft RTP products to assess total customer impact for that family in September 2013.

Family Weight Calculation

The family weighting was calculated by dividing the number of Microsoft RTP computers that encountered each family by the entire number of RTP computers that encounter any high or severe malware during the period. The family mapping used is based on the naming⁷ given by Microsoft at a specific point in time (time of testing). This weight was then applied to misses for that family in the test set (see calculation details below). Finally, these weightings were summed to give the final weighted score of each vendor.

$$\text{FamilyWeight} = \frac{\text{MachinesEncounteringSpecificFamily}}{\text{TotalMachinesEncounteringAnyMalware}}$$

Vendor impact calculation

The total vendor impact calculation is generated by first measuring the machines encountering the missed files per vendor per family, which we call the MissedFileFamilyMachineCount. The FamilyWeight for each family is then applied to the MissedFileFamilyMachineCount and the results are summed over all families, which produces the NonNormalisedVendorImpact.

$$\text{MissedFileFamilyMachineCount}_{\text{PerVendorPerFamily}} = \left(\sum_{\text{FileFamily}} \text{MissedFileMachineCount}_{\text{PerFamily}} \right) * \text{FamilyWeight}$$

$$\text{NonNormalizedVendorImpact} = \sum_{\text{Families}} \text{MissedFileFamilyMachineCount}$$

The WholeTestImpact is then calculated to normalise the NonNormalisedVendorImpact. The WholeTestImpact is calculated by first measuring the machines encountering the all files per family in the test set, which we call the WholeTestFileFamilyMachineCount. The FamilyWeight for each family is

⁷ <http://www.microsoft.com/security/portal/mmpc/shared/malwareNaming.aspx>

then applied to the WholeTestFileFamilyMachineCount and the results are summed over all families, which produces the WholeTestImpact. Finally, the VendorImpact is calculated by dividing the NonNormalisedVendorImpact by the WholeTestImpact.

$$\text{WholeFileFamilyMachineCount}_{\text{PerFamily}} = \left(\sum_{\text{FileFamily}} \text{WholeTestFileMachineCount}_{\text{PerFamily}} \right) * \text{FamilyWeight}$$

$$\text{WholeTestImpact} = \sum_{\text{Families}} \text{WholeFileFamilyMachineCount}$$

$$\text{VendorImpact} = \frac{\text{NonNormalizedVendorImpact}}{\text{WholeTestImpact}}$$

Country Vendor Impact calculation

Country-based vendor impacts were calculated in a similar way to the total vendor impact calculation outlined above: The MissedFileFamilyMachineCount per vendor per family from above was weighted using a the FamilyWeightByCountry, which is a geo-specific family weighting for each country and malware family. This weighted result produces the NonNormalisedVendorImpact_{ByCountry}.

$$\text{FamilyWeightByCountry} = \frac{\text{MachinesEncounteringSpecificFamilyPerCountry}}{\text{TotalMachinesEncounteringAnyMalwarePerCountry}}$$

$$\text{MissedFileFamilyMachineCount}_{\text{PerVendorPerFamilyPerCountry}} = \left(\sum_{\text{FileFamily}} \text{MissedFileMachineCount}_{\text{PerFamily}} \right) * \text{FamilyWeightByCountry}$$

$$\text{NonNormalizedVendorImpact}_{\text{ByCountry}} = \sum_{\text{Families}} \text{MissedFileFamilyMachineCount}_{\text{PerCountry}}$$

Finally, the WholeTestImpactPerCountry was calculated by applying the FamilyWeightByCountry to the WholeTestFileMachineCount_{PerFamily} described above. This was then used to normalise the NonNormalisedVendorImpact_{ByCountry} to produce the final VendorImpactByCountry.

$$\text{WholeFileFamilyMachineCount}_{\text{PerFamilyPerCountry}} = \left(\sum_{\text{FileFamily}} \text{WholeTestFileMachineCount}_{\text{PerFamily}} \right) * \text{FamilyWeightByCountry}$$

$$\text{WholeTestImpactPerCountry} = \sum_{\text{Families}} \text{WholeFileFamilyMachineCount}_{\text{PerCountry}}$$

$$\text{VendorImpactByCountry} = \frac{\text{NonNormalizedVendorImpactByCountry}}{\text{WholeTestImpactByCountry}}$$

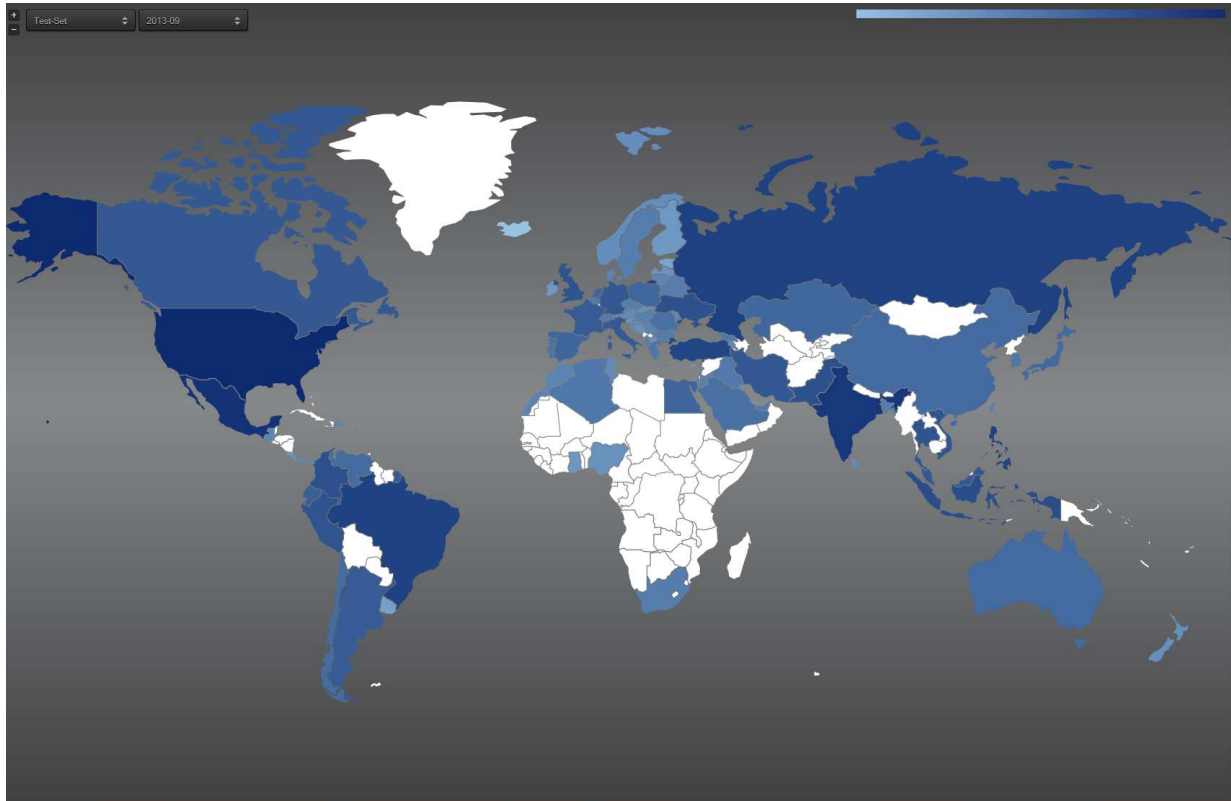
Microsoft regularly reviews and refines its data collection methodology to improve its scope and accuracy. For this reason, the statistics presented in this report may differ from comparable statistics in future reports.

Microsoft generated telemetry information on many of the files that they did not have detection for, so for those files they had customer impact numbers as well. For the files for which Microsoft did not have customer impact numbers, Microsoft used the average customer impact of the low-prevalence files in the test. Therefore, a generic family has been created and an average family weighting has been used to calculate the impact of malware samples not detected by Microsoft.

This report should be regarded as a prototype, the purpose of which is spark debate on the significance of prevalence data, and promote ideas for improving the method. For upcoming prevalence analysis reports, the goal would be to translate third-party detections into Microsoft families to increase the accuracy. This would involve other vendors working closely with Microsoft to understand how various vendors count prevalence and to investigate how to roll in telemetry from other vendors, in order to produce a better picture. AV-Comparatives encourage vendors to share their telemetry data with Microsoft, in order to get a more significant and impartial customer-impact analysis.

Test-Set description

The test-set used in September 2013 for the File-Detection Test contained 129253 malware samples. About one dozen unsuitable samples (adware, hacking tools, etc.) were removed and excluded from the calculations. The number of encounters caused by the malware samples used in the test was according to Microsoft’s telemetry data around 1,371,670. Over 1 million unique machines were affected (in some cases, more than one malware was encountered on an individual machine). The world map below shows the countries in which the malicious files had the biggest impact.



There are over 150 countries of the world for which Microsoft have data for less than 100,000 computers. These are considered to be too small to be statistically relevant – the margin of error is too high to accurately represent the population of Internet users in the country. These appear as white on the map.

Top 20 impacted countries:

1. United States	12.6%	11. Pakistan	2.3%
2. Mexico	8.6%	12. Thailand	2.1%
3. India	7.4%	13. United Kingdom	2.1%
4. Russian Federation	4.6%	14. Peru	2.1%
5. Brazil	4.4%	15. Vietnam	1.9%
6. Philippines	4.4%	16. Germany	1.7%
7. Turkey	3.8%	17. Iran	1.7%
8. Indonesia	2.8%	18. Canda	1.6%
9. Colombia	2.4%	19. Malaysia	1.6%
10. Ukraine	2.3%	20. Italy	1.6%

Detection Rates and Customer Impact

Based on the missed samples and the detection rate over the whole test-set, Microsoft have calculated a value called the FinalVendorImpactNormalisedByTestSet, which represents the normalised Customer Impact. This can be seen in the table below. The Customer Impact can be read as follows: Microsoft (for example) has 0.003556, which means that statistically speaking, 356 in 100000 systems would have been affected. The different colors in the table illustrate products scoring better than the baseline (Microsoft).

	Customer Impact (normalised)	Missed machines out of 1000	Missed Samples	100% -Missed Samples
1. Panda	0.000040	0.040	0.4%	99.6%
2. Kaspersky Lab	0.000072	0.072	0.5%	99.5%
3. McAfee	0.000202	0.202	0.4%	99.6%
4. Sophos	0.000303	0.303	1.8%	98.2%
5. Trend Micro	0.001206	1.206	1.8%	98.2%
6. F-Secure	0.002032	2.032	0.3%	99.7%
7. ThreatTrack Vipre	0.002141	2.141	1.0%	99.0%
8. Tencent	0.002560	2.560	0.3%	99.7%
9. Fortinet	0.002595	2.595	1.0%	99.0%
10. AVIRA	0.002710	2.710	0.3%	99.7%
11. Kingsoft	0.002724	2.724	0.3%	99.7%
12. ESET	0.003233	3.233	2.9%	97.1%
13. Bitdefender	0.003329	3.329	0.5%	99.5%
14. Qihoo	0.003342	3.342	0.6%	99.4%
15. BullGuard	0.003346	3.346	0.6%	99.4%
16. Emsisoft	0.003580	3.580	0.5%	99.5%
17. eScan	0.003587	3.587	0.6%	99.4%
18. Avast	0.009272	9.272	3.5%	96.5%
19. AVG	0.009279	9.279	1.7%	98.3%
20. AhnLab	0.030566	30.057	9.5%	90.5%

* Microsoft is represented as the baseline with the following results: customer impact (normalized) of 0.00358, missed 3.556 machines out of 1000, missed 9.9% of samples, or "100% - missed sample percentage" of 90.1%.

For some few vendors there is a significant difference between the number of missed samples and the Customer Impact. In some cases, a high number of missed files did not translate into a high Customer Impact. This indicates that the samples detected in the test were those with higher prevalence, while those that were not detected had lower prevalence. Conversely, in some cases vendors with a low number of missed samples had a relatively high Customer Impact. In these cases, the samples that were missed were higher prevalence samples, which had a greater impact on the customer population.

This supplementary report suggests that using prevalence to weight malicious file detection tests can produce useful insights into the efficacy of antimalware products against the most common risks. That is, when file-detection test results are weighted by malware family prevalence it is possible to get a better idea of the risk that customers face when using antimalware products.

Furthermore, it shows that detection of highly prevalent malware is valuable in reducing the risk to customers, and is a useful factor for detection prioritization.

Heat-Maps Overview

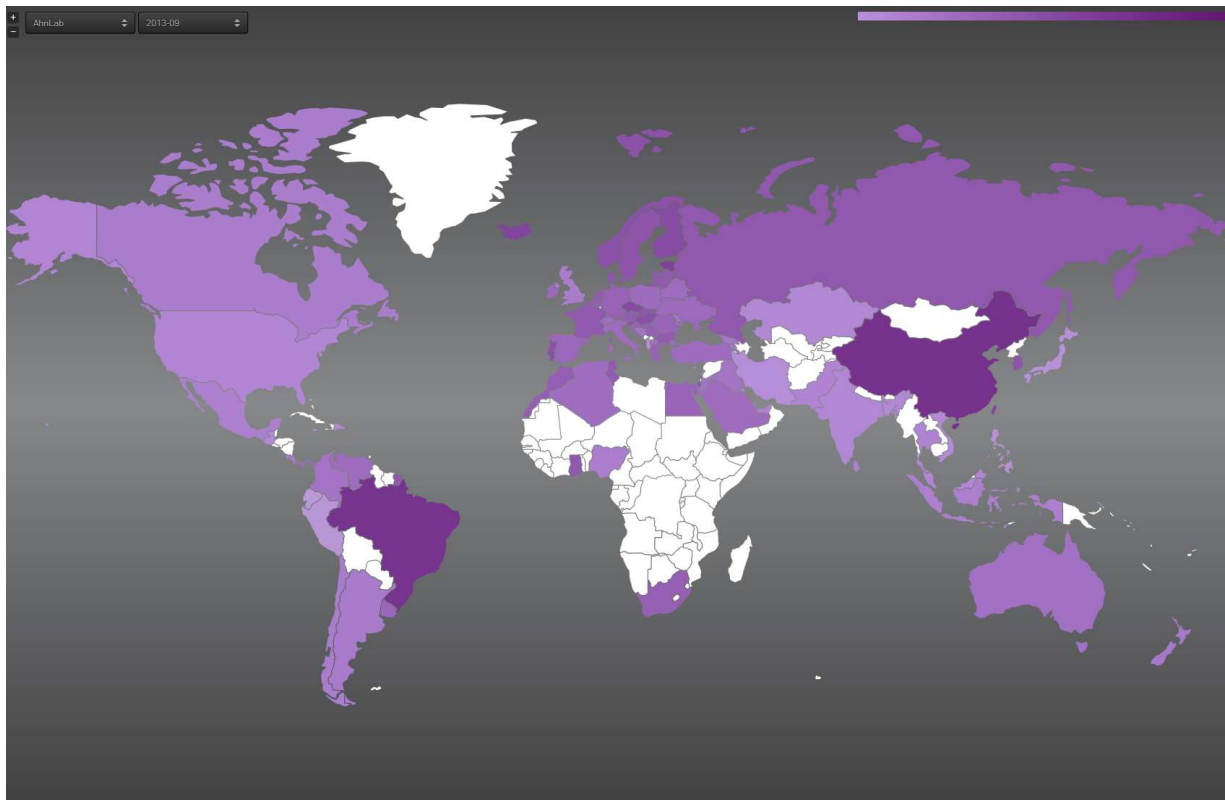
The interactive heat maps can be found on <http://impact.av-comparatives.org>



The heat maps for each vendor, i.e. the coloured maps of the world show data that is normalised by the relative size of the country. Thus the maps represent the countries with the highest risk relative to the prevalence of files that were missed in the test set. This normalisation differs from the heat map displayed in the **Test-Set Description**; that map is normalised based on the prevalence of the entire test set to show the prevalence of the files that were used in the test set. As a consequence, the scale on the vendor-specific heat maps and the colours shows are not directly comparable to the test-set description heat map.

AhnLab V3 Internet Security 8.0.8.1

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



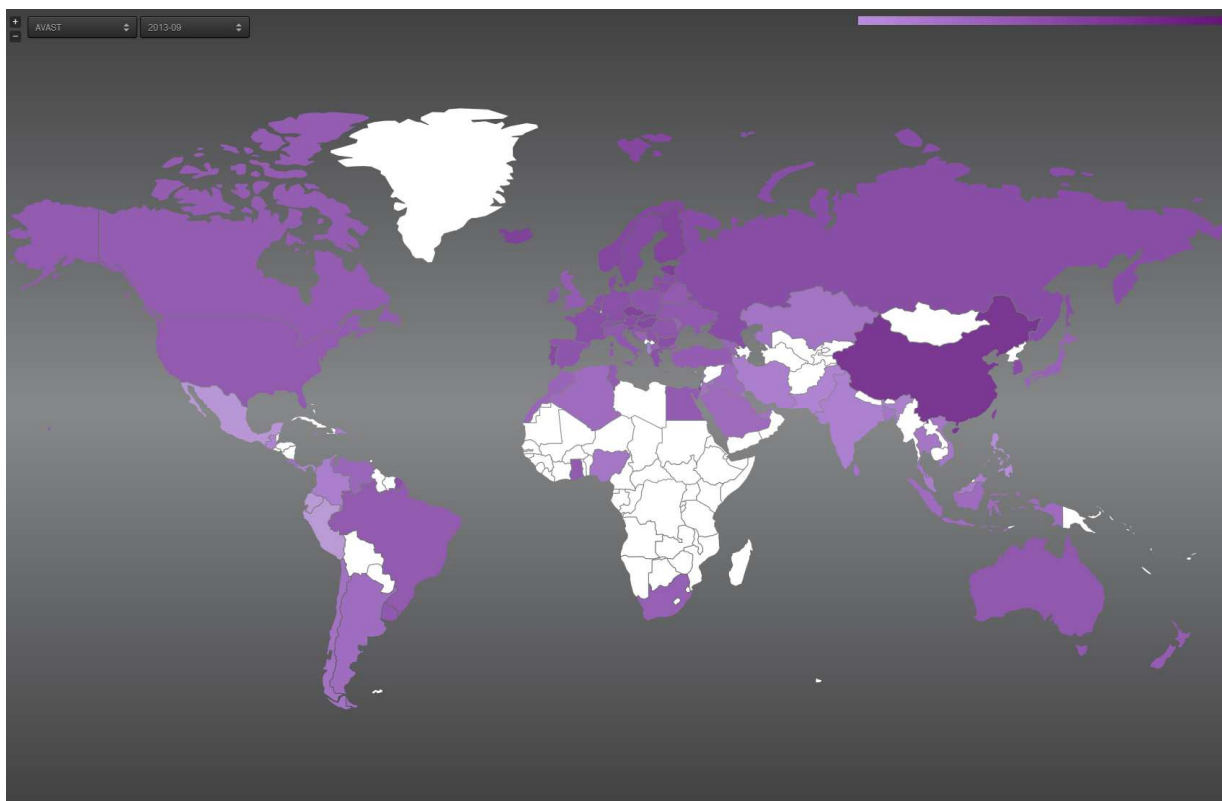
Customer Impact by Country/Region (normalised):

1. China	8553 in 100000	11. Hungary	5166 in 100000
2. Brazil	8270 in 100000	12. Norway	5103 in 100000
3. Estonia	6623 in 100000	13. Slovenia	5046 in 100000
4. Iceland	6156 in 100000	14. South Korea	4942 in 100000
5. Taiwan	6134 in 100000	15. Sweden	4843 in 100000
6. Czech Republic	5765 in 100000	16. Denmark	4803 in 100000
7. Finland	5604 in 100000	17. Slovak Republic	4790 in 100000
8. Hong Kong	5252 in 100000	18. Russian Federation	4590 in 100000
9. Israel	5206 in 100000	19. France	4499 in 100000
10. Portugal	5172 in 100000	20. Ghana	4463 in 100000

Global Non-Detection Risk: 3057 in 100000

avast! Free Antivirus 8.0.1497

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



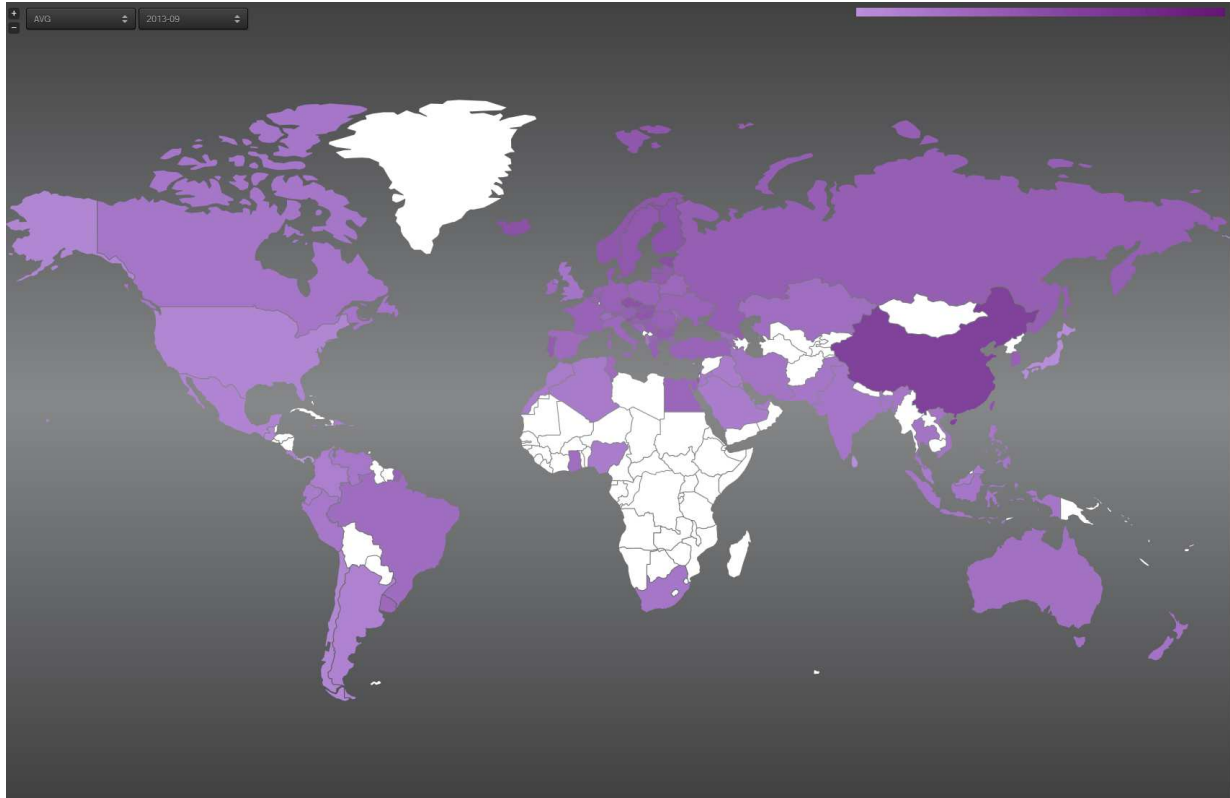
Customer Impact by Country/Region (normalised):

1. China	4177 in 100000	11. Denmark	2316 in 100000
2. Estonia	3133 in 100000	12. Slovenia	2291 in 100000
3. Iceland	2971 in 100000	13. Portugal	2123 in 100000
4. Finland	2785 in 100000	14. Israel	2115 in 100000
5. Czech Republic	2753 in 100000	15. Slovak Republic	2103 in 100000
6. Taiwan	2529 in 100000	16. Austria	1961 in 100000
7. Hong Kong	2524 in 100000	17. Russian Federation	1931 in 100000
8. Norway	2457 in 100000	18. South Korea	1913 in 100000
9. Sweden	2325 in 100000	19. Lithuania	1884 in 100000
10. Hungary	2319 in 100000	20. Latvia	1855 in 100000

Global Non-Detection Risk: 927 in 100000

AVG Anti-Virus 2014.0.4116

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



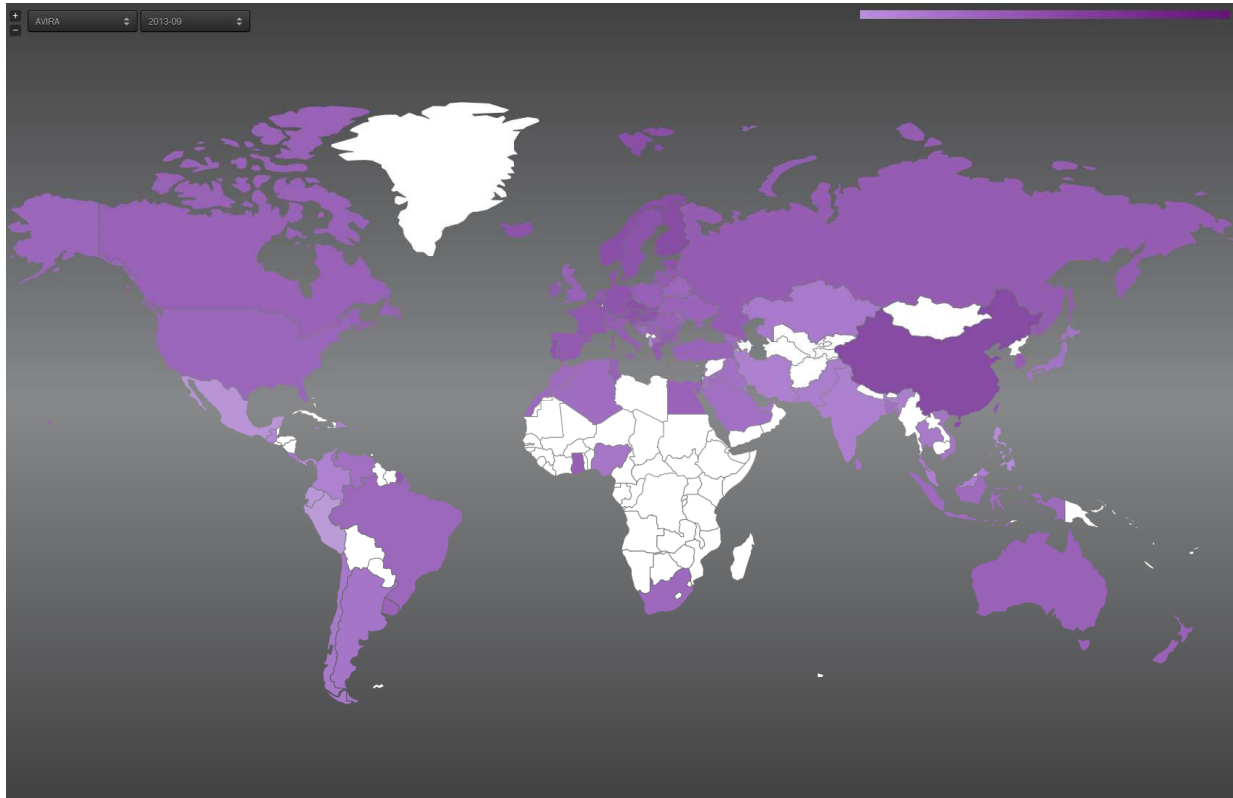
Customer Impact by Country/Region (normalised):

1. China	3685 in 100000	11. Slovak Republic	1923 in 100000
2. Estonia	2591 in 100000	12. Sweden	1913 in 100000
3. Iceland	2381 in 100000	13. Israel	1857 in 100000
4. Czech Republic	2300 in 100000	14. Denmark	1812 in 100000
5. Finland	2270 in 100000	15. Lithuania	1801 in 100000
6. Taiwan	2174 in 100000	16. Portugal	1781 in 100000
7. Slovenia	2008 in 100000	17. Latvia	1741 in 100000
8. Hong Kong	2007 in 100000	18. Bulgaria	1722 in 100000
9. Hungary	2004 in 100000	19. Serbia	1621 in 100000
10. Norway	1978 in 100000	20. Russian Federation	1612 in 100000

Global Non-Detection Risk: 928 in 100000

AVIRA Antivirus Premium 13.0.0.4052

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



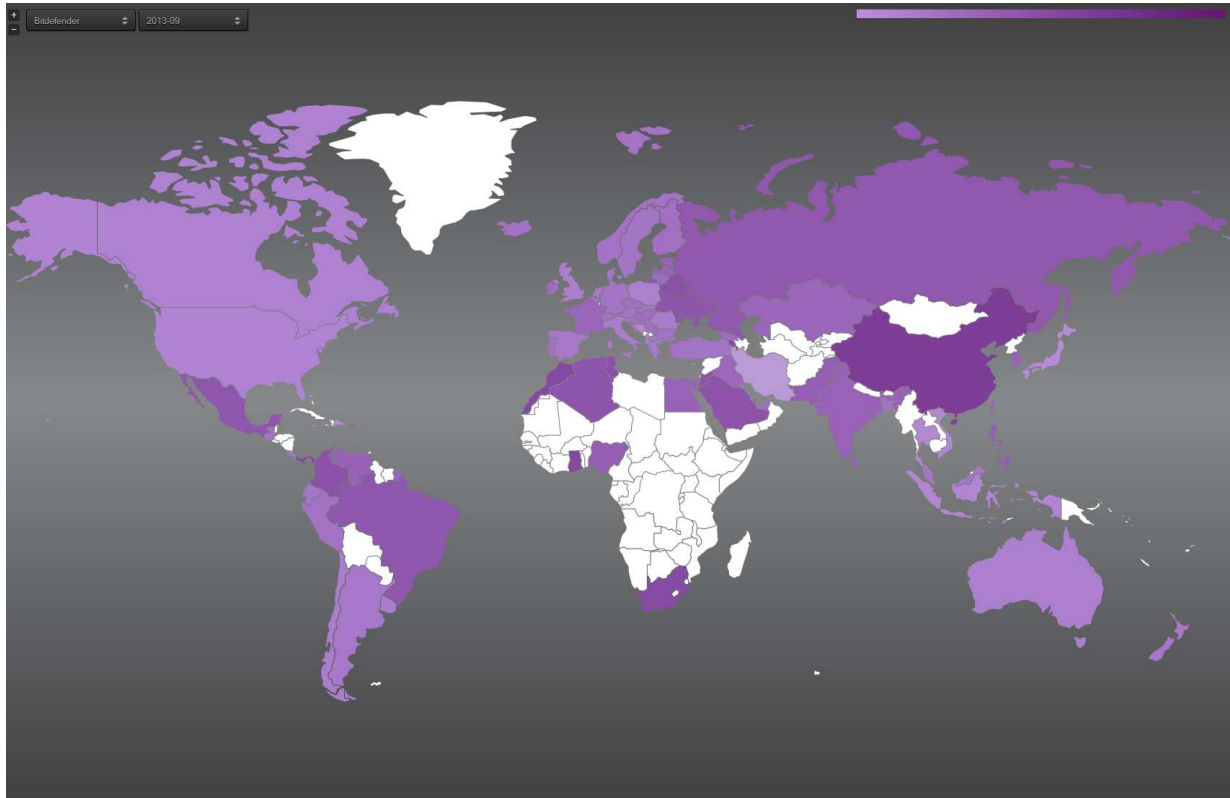
Customer Impact by Country/Region (normalised):

1. China	1167 in 100000	11. Hungary	725 in 100000
2. Finland	1080 in 100000	12. Belgium	715 in 100000
3. Norway	955 in 100000	13. Portugal	707 in 100000
4. Czech Republic	928 in 100000	14. Germany	701 in 100000
5. Estonia	855 in 100000	15. Taiwan	694 in 100000
6. Austria	819 in 100000	16. Slovak Republic	664 in 100000
7. Sweden	810 in 100000	17. Hong Kong	663 in 100000
8. Iceland	804 in 100000	18. Ireland	622 in 100000
9. Denmark	791 in 100000	19. France	611 in 100000
10. Slovenia	744 in 100000	20. Netherlands	574 in 100000

Global Non-Detection Risk: 271 in 100000

Bitdefender Anti-Virus+ 17.17.0.773

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



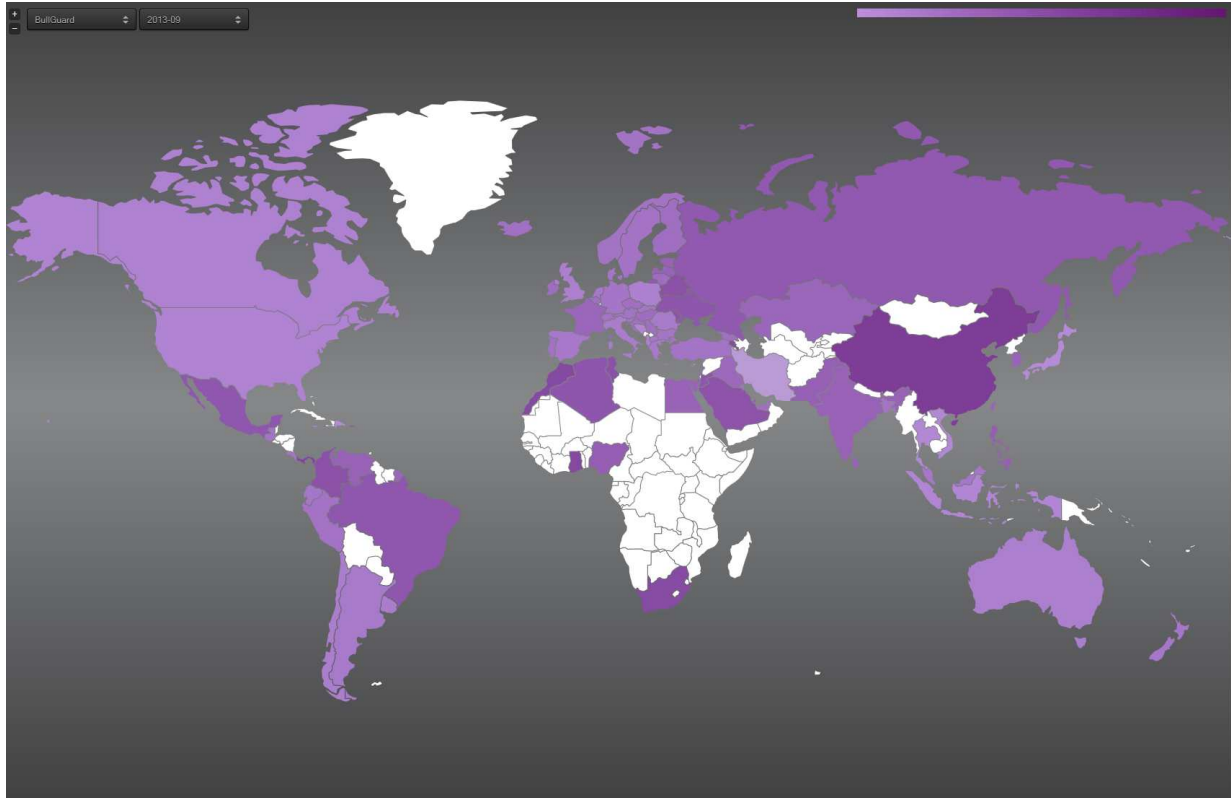
Customer Impact by Country/Region (normalised):

1. China	2119 in 100000	11. Saudi Arabia	738 in 100000
2. Panama	1552 in 100000	12. Jordan	687 in 100000
3. Ghana	1369 in 100000	13. Algeria	675 in 100000
4. Morocco	1216 in 100000	14. Puerto Rico	675 in 100000
5. South Africa	1169 in 100000	15. Ukraine	657 in 100000
6. Armenia	1139 in 100000	16. Mexico	638 in 100000
7. Colombia	837 in 100000	17. Brazil	636 in 100000
8. Belarus	833 in 100000	18. Russian Federation	578 in 100000
9. Tunisia	816 in 100000	19. Qatar	508 in 100000
10. Moldova	755 in 100000	20. Philippines	455 in 100000

Global Non-Detection Risk: 333 in 100000

BullGuard Antivirus 13.0.26.261.9

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



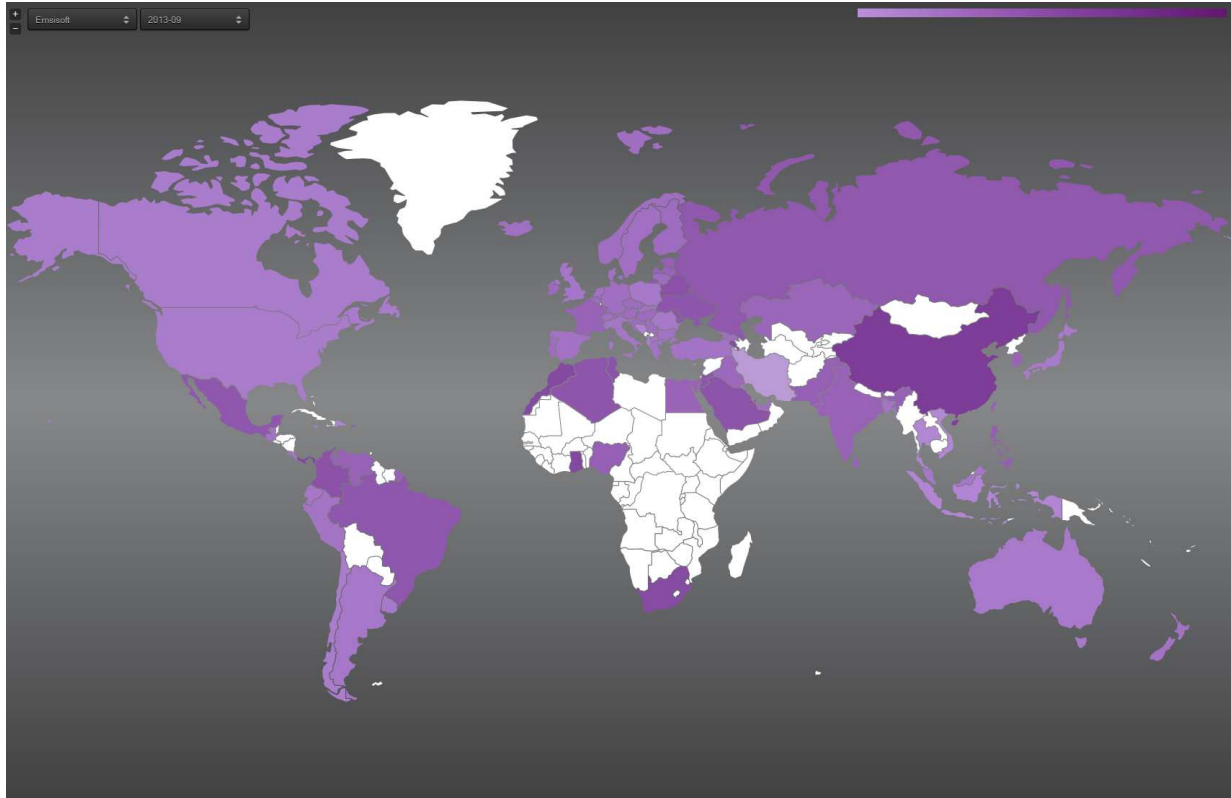
Customer Impact by Country/Region (normalised):

1. China	2129 in 100000	11. Saudi Arabia	739 in 100000
2. Panama	1553 in 100000	12. Jordan	689 in 100000
3. Ghana	1271 in 100000	13. Algeria	677 in 100000
4. Morocco	1218 in 100000	14. Puerto Rico	676 in 100000
5. South Africa	1171 in 100000	15. Ukraine	660 in 100000
6. Armenia	1141 in 100000	16. Mexico	639 in 100000
7. Colombia	837 in 100000	17. Brazil	638 in 100000
8. Belarus	836 in 100000	18. Russian Federation	583 in 100000
9. Tunisia	818 in 100000	19. Qatar	509 in 100000
10. Moldova	757 in 100000	20. Philippines	455 in 100000

Global Non-Detection Risk: 335 in 100000

Emsisoft Anti-Malware 8.1.0.4

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



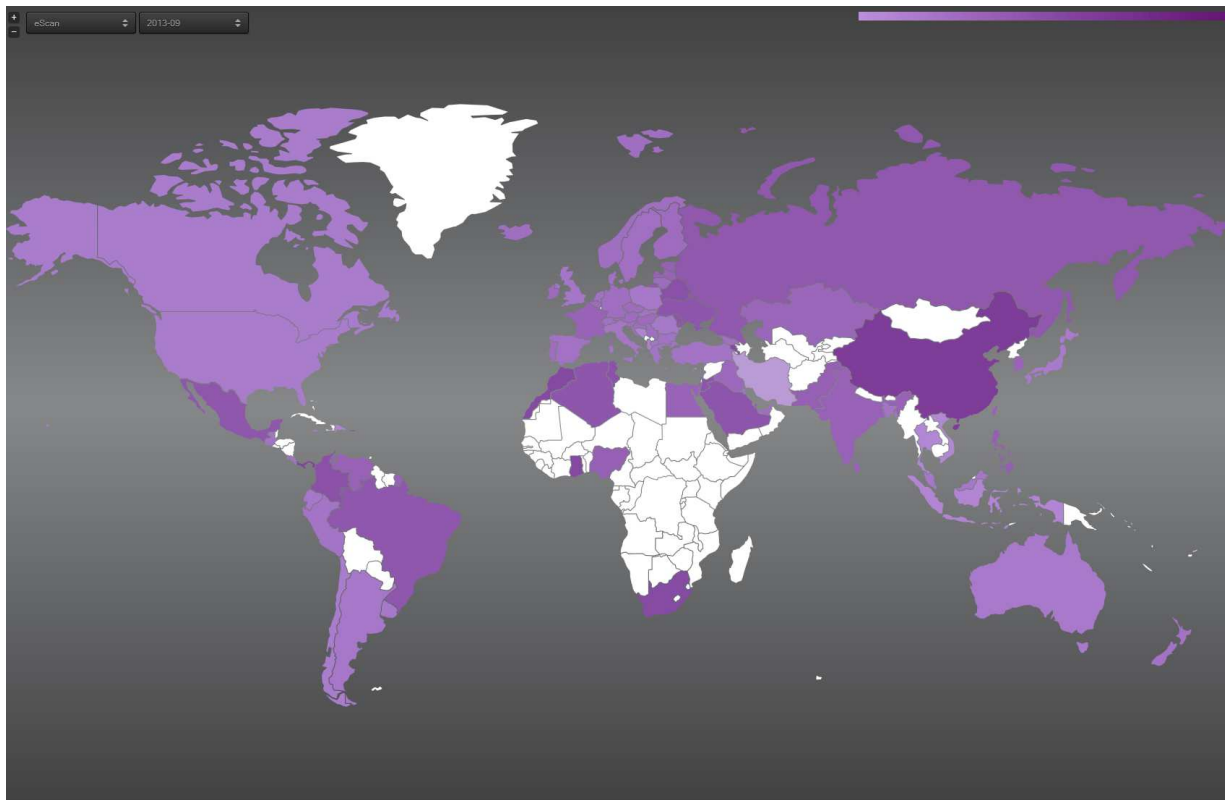
Customer Impact by Country/Region (normalised):

1. China	2134 in 100000	11. Saudi Arabia	758 in 100000
2. Panama	1562 in 100000	12. Puerto Rico	714 in 100000
3. Ghana	1282 in 100000	13. Ukraine	703 in 100000
4. Morocco	1237 in 100000	14. Jordan	798 in 100000
5. South Africa	1206 in 100000	15. Algeria	685 in 100000
6. Armenia	1149 in 100000	16. Brazil	666 in 100000
7. Belarus	883 in 100000	17. Mexico	646 in 100000
8. Colombia	850 in 100000	18. Russian Federation	615 in 100000
9. Tunisia	837 in 100000	19. Qatar	527 in 100000
10. Moldova	763 in 100000	20. Philippines	459 in 100000

Global Non-Detection Risk: 358 in 100000

eScan Anti-Virus 14.0.1400.1457

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



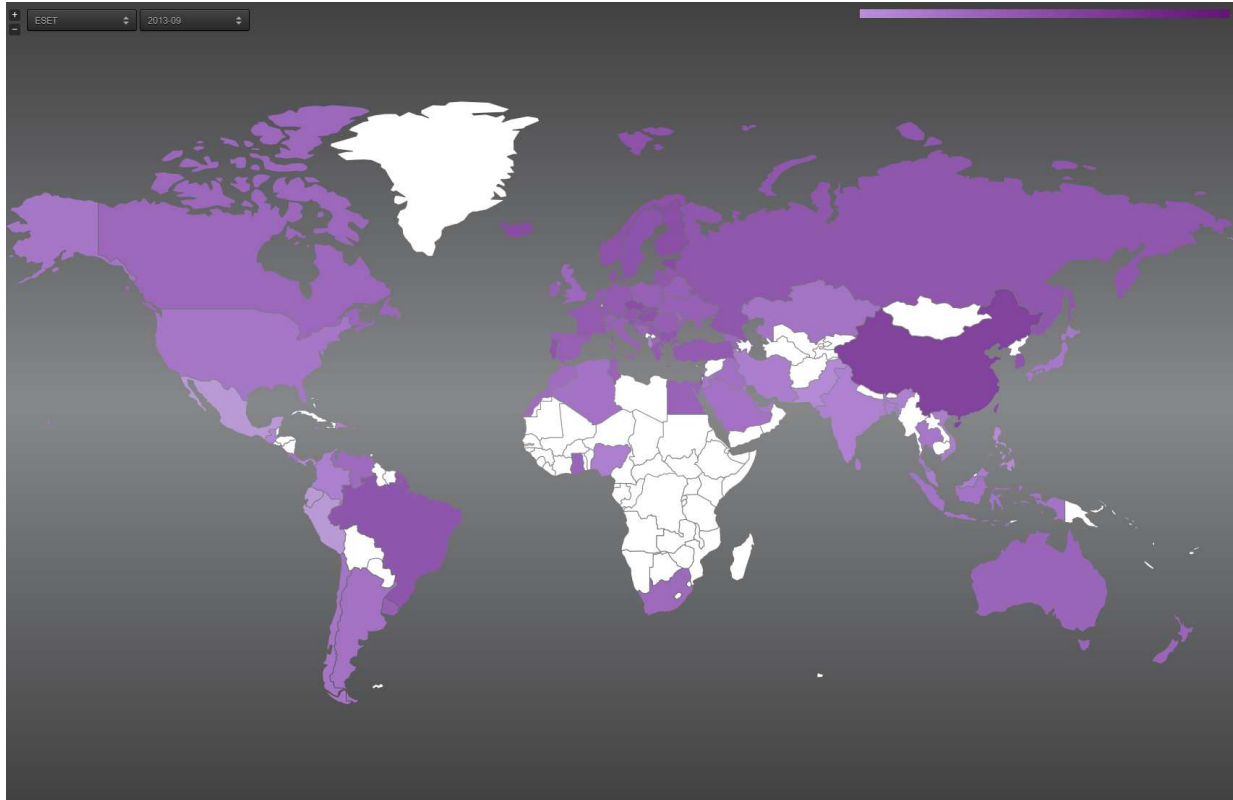
Customer Impact by Country/Region (normalised):

1. China	2138 in 100000	11. Saudi Arabia	758 in 100000
2. Panama	1562 in 100000	12. Puerto Rico	714 in 100000
3. Ghana	1284 in 100000	13. Ukraine	704 in 100000
4. Morocco	1237 in 100000	14. Jordan	699 in 100000
5. South Africa	1207 in 100000	15. Algeria	686 in 100000
6. Armenia	1151 in 100000	16. Brazil	666 in 100000
7. Belarus	885 in 100000	17. Mexico	647 in 100000
8. Colombia	850 in 100000	18. Russian Federation	619 in 100000
9. Tunisia	838 in 100000	19. Qatar	527 in 100000
10. Moldova	764 in 100000	20. Philippines	460 in 100000

Global Non-Detection Risk: 359 in 100000

ESET NOD32 Antivirus 6.0.316.1

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



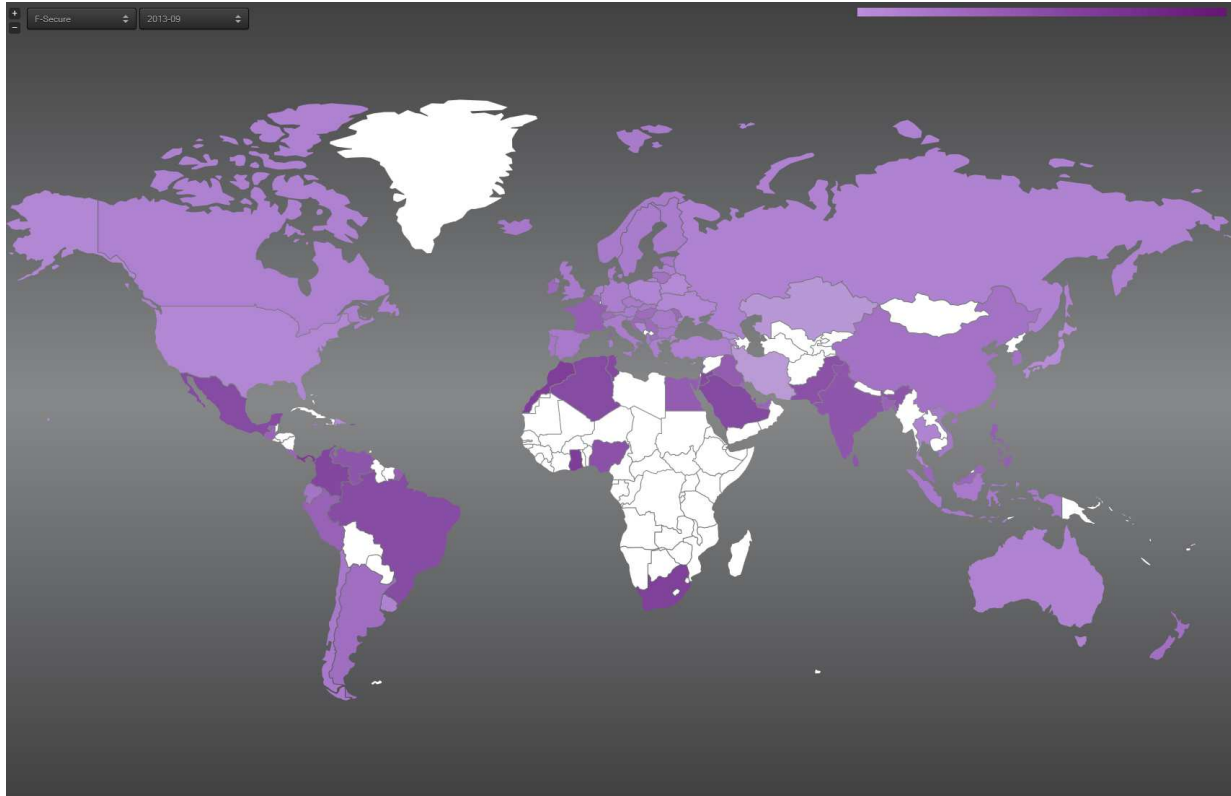
Customer Impact by Country/Region (normalised):

1. China	1853 in 100000	11. Slovenia	906 in 100000
2. Estonia	1241 in 100000	12. Portugal	848 in 100000
3. Iceland	1142 in 100000	13. Denmark	846 in 100000
4. Czech Republic	1095 in 100000	14. Slovak Republic	835 in 100000
5. Finland	1093 in 100000	15. Israel	831 in 100000
6. Taiwan	1008 in 100000	16. South Korea	828 in 100000
7. Hong Kong	948 in 100000	17. Brazil	808 in 100000
8. Norway	948 in 100000	18. Russian Federation	756 in 100000
9. Hungary	929 in 100000	19. Bulgaria	745 in 100000
10. Sweden	908 in 100000	20. Lithuania	740 in 100000

Global Non-Detection Risk: 323 in 100000

F-Secure Anti-Virus 12.89.105

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



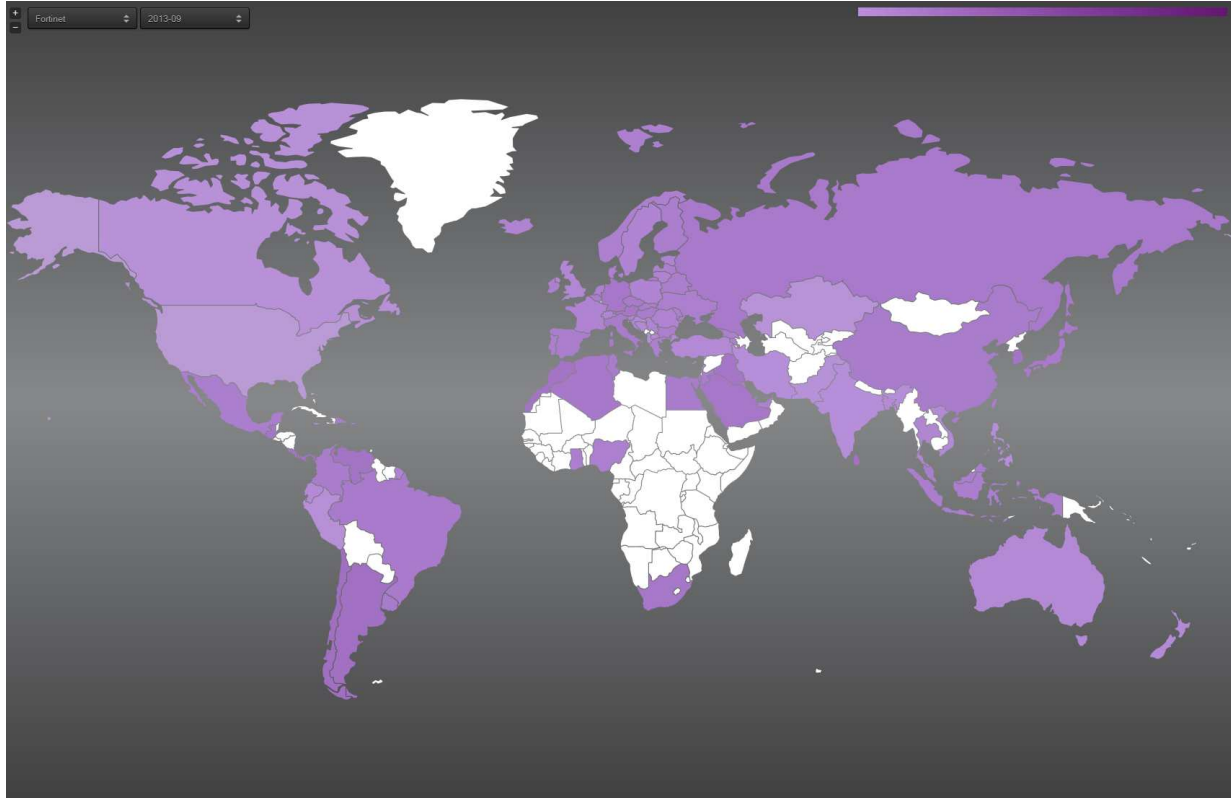
Customer Impact by Country/Region (normalised):

1. Panama	1511 in 100000	11. Algeria	612 in 100000
2. Ghana	1190 in 100000	12. Brazil	564 in 100000
3. Morocco	1149 in 100000	13. Qatar	436 in 100000
4. South Africa	1097 in 100000	14. Pakistan	420 in 100000
5. Colombia	794 in 100000	15. Nigeria	410 in 100000
6. Tunisia	701 in 100000	16. Sri Lanka	322 in 100000
7. Saudi Arabia	651 in 100000	17. India	315 in 100000
8. Puerto Rico	635 in 100000	18. Venezuela	309 in 100000
9. Jordan	623 in 100000	19. Iraq	217 in 100000
10. Mexico	612 in 100000	20. Lebanon	215 in 100000

Global Non-Detection Risk: 203 in 100000

Fortinet FortiClient 5.0.5.308

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



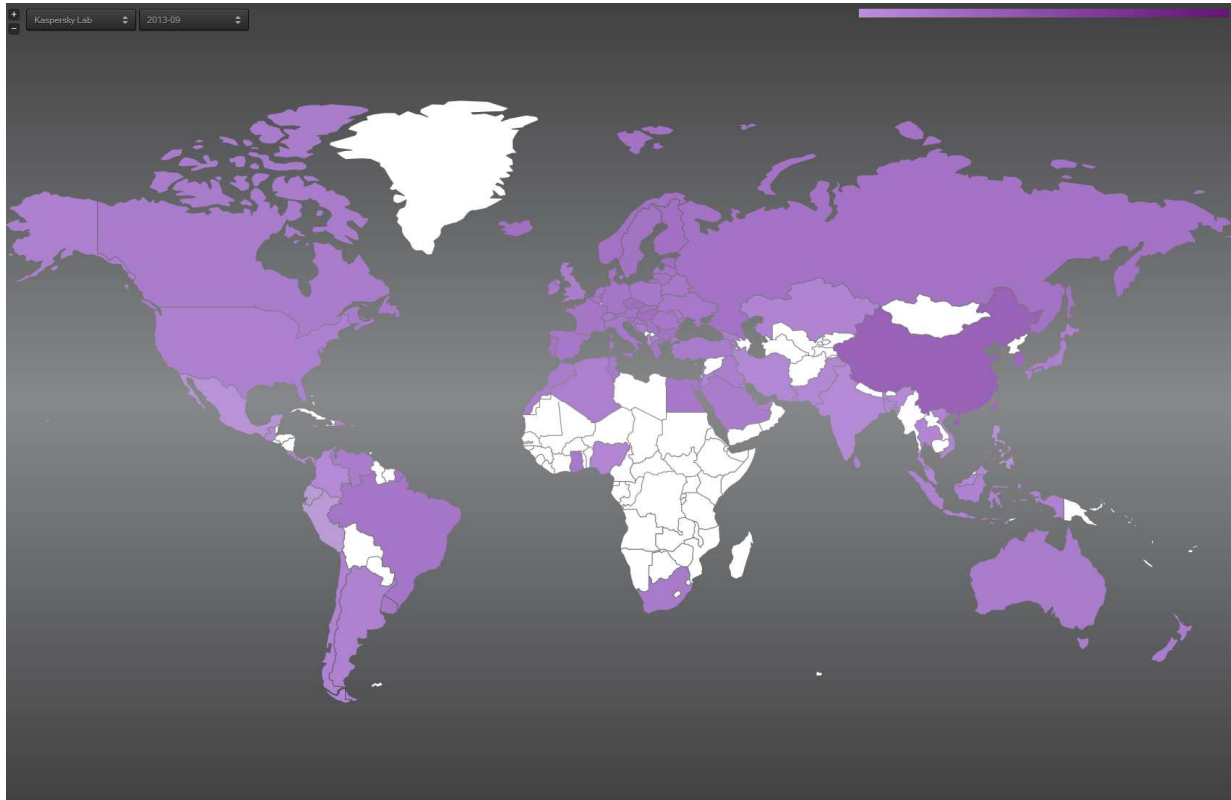
Customer Impact by Country/Region (normalised):

1. Chile	520 in 100000	11. Germany	390 in 100000
2. Argentina	496 in 100000	12. South Africa	388 in 100000
3. Sri Lanka	487 in 100000	13. Saudi Arabia	388 in 100000
4. Morocco	457 in 100000	14. Algeria	377 in 100000
5. Venezuela	456 in 100000	15. Austria	376 in 100000
6. Panama	453 in 100000	16. Russian Federation	358 in 100000
7. Costa Rica	447 in 100000	17. Uruguay	356 in 100000
8. South Korea	437 in 100000	18. Brazil	347 in 100000
9. Guatemala	414 in 100000	19. Japan	346 in 100000
10. Iraq	407 in 100000	20. Czech Republic	345 in 100000

Global Non-Detection Risk: 259 in 100000

Kaspersky Anti-Virus 14.0.0.4651 (a)

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



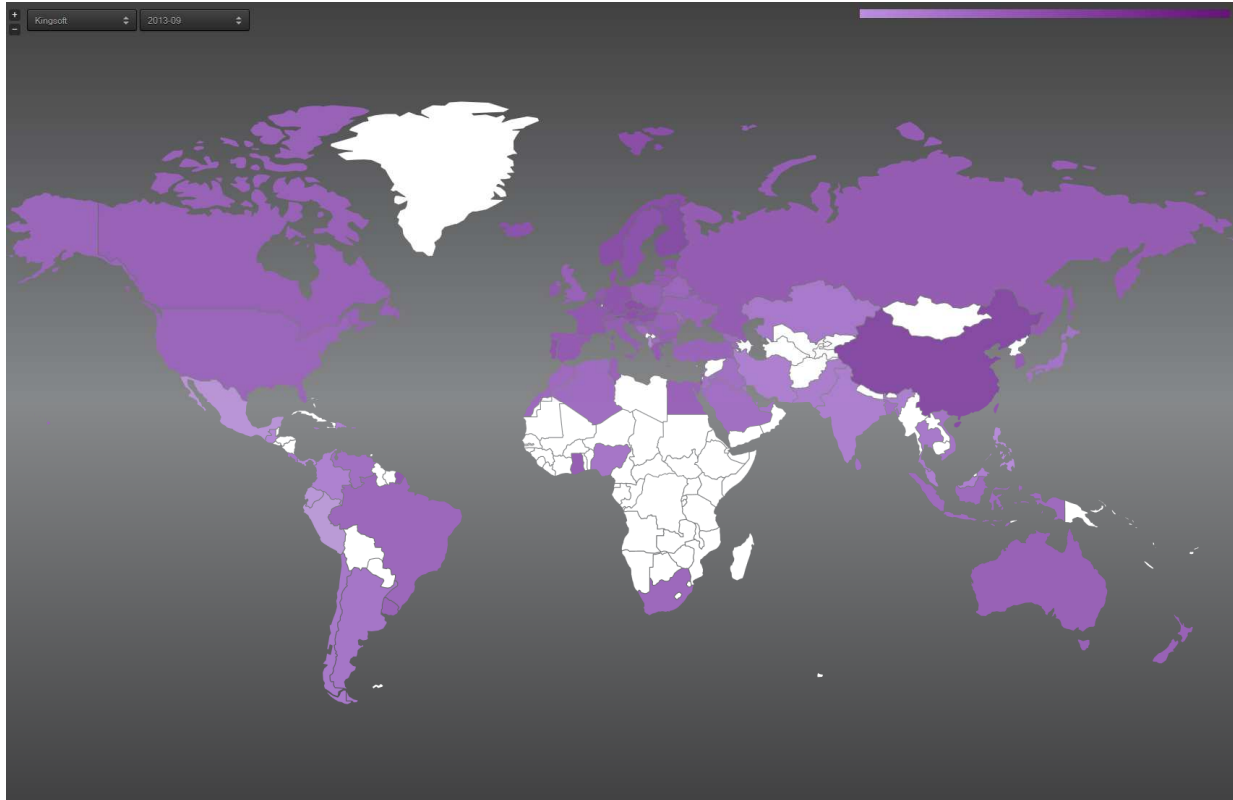
Customer Impact by Country/Region (normalised):

1. China	54 in 100000	11. Israel	17 in 100000
2. South Korea	36 in 100000	12. Sweden	16 in 100000
3. Taiwan	28 in 100000	13. Russian Federation	16 in 100000
4. Estonia	23 in 100000	14. Slovenia	16 in 100000
5. Hungary	21 in 100000	15. Portugal	16 in 100000
6. Czech Republic	20 in 100000	16. Slovak Republic	15 in 100000
7. Hong Kong	20 in 100000	17. Bulgaria	15 in 100000
8. Iceland	20 in 100000	18. Denmark	15 in 100000
9. Finland	19 in 100000	19. Latvia	14 in 100000
10. Norway	17 in 100000	20. Lithuania	14 in 100000

Global Non-Detection Risk: 7 in 100000

Kingsoft Internet Security 2013.SP4.5

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



Customer Impact by Country/Region (normalised):

1. China	1170 in 100000	11. Hungary	727 in 100000
2. Finland	1082 in 100000	12. Belgium	717 in 100000
3. Norway	957 in 100000	13. Portugal	710 in 100000
4. Czech Republic	930 in 100000	14. Germany	703 in 100000
5. Estonia	856 in 100000	15. Taiwan	698 in 100000
6. Austria	821 in 100000	16. Slovak Republic	666 in 100000
7. Sweden	812 in 100000	17. Hong Kong	665 in 100000
8. Iceland	806 in 100000	18. Ireland	624 in 100000
9. Denmark	793 in 100000	19. France	613 in 100000
10. Slovenia	745 in 100000	20. Netherlands	577 in 100000

Global Non-Detection Risk: 272 in 100000

McAfee AntiVirus Plus 16.1.144

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



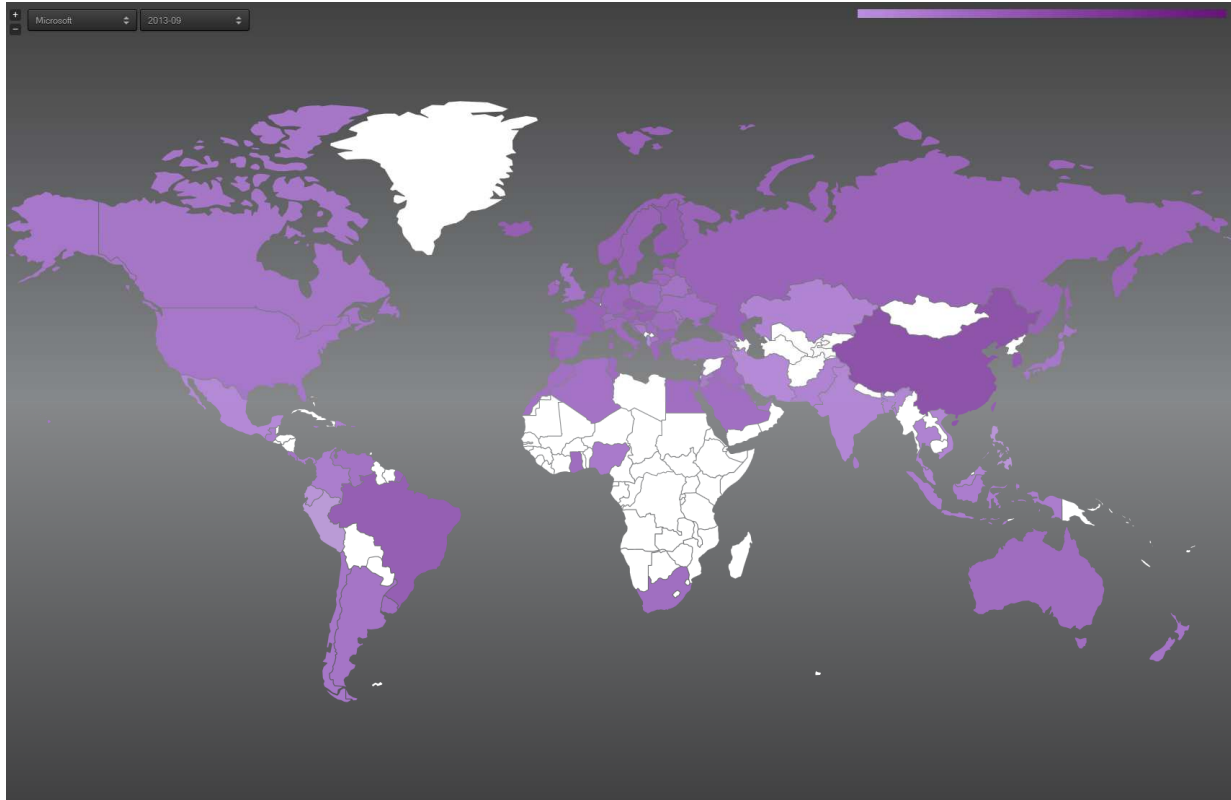
Customer Impact by Country/Region (normalised):

1. China	94 in 100000	11. Hungary	45 in 100000
2. South Korea	61 in 100000	12. Sweden	44 in 100000
3. Estonia	60 in 100000	13. Israel	43 in 100000
4. Iceland	55 in 100000	14. Slovak Republic	42 in 100000
5. Taiwan	53 in 100000	15. Denmark	42 in 100000
6. Czech Republic	53 in 100000	16. Portugal	41 in 100000
7. Finland	52 in 100000	17. Lithuania	39 in 100000
8. Hong Kong	48 in 100000	18. Russian Federation	39 in 100000
9. Slovenia	46 in 100000	19. Latvia	38 in 100000
10. Norway	46 in 100000	20. Bulgaria	38 in 100000

Global Non-Detection Risk: 20 in 100000

Microsoft Security Essentials 4.3.216.0

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



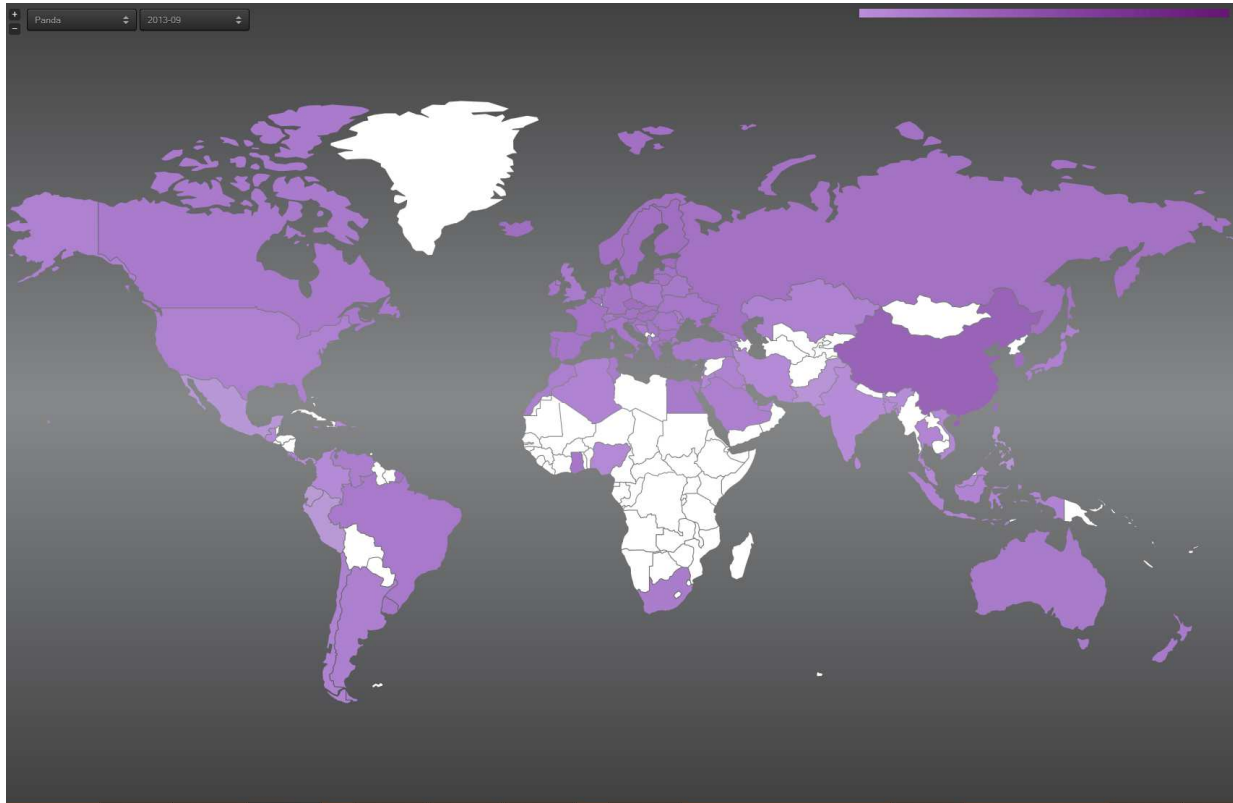
Customer Impact by Country/Region (normalised):

1. China	1272 in 100000	11. Portugal	733 in 100000
2. South Korea	920 in 100000	12. Israel	732 in 100000
3. Estonia	888 in 100000	13. Hong Kong	729 in 100000
4. Finland	846 in 100000	14. Denmark	719 in 100000
5. Taiwan	843 in 100000	15. Slovenia	704 in 100000
6. Czech Republic	833 in 100000	16. Sweden	695 in 100000
7. Brazil	828 in 100000	17. France	654 in 100000
8. Iceland	813 in 100000	18. Netherlands	653 in 100000
9. Hungary	766 in 100000	19. Russian Federation	653 in 100000
10. Norway	740 in 100000	20. Slovak Republic	641 in 100000

Global Non-Detection Risk: 356 in 100000

Panda Cloud Free Antivirus 2.2.1

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



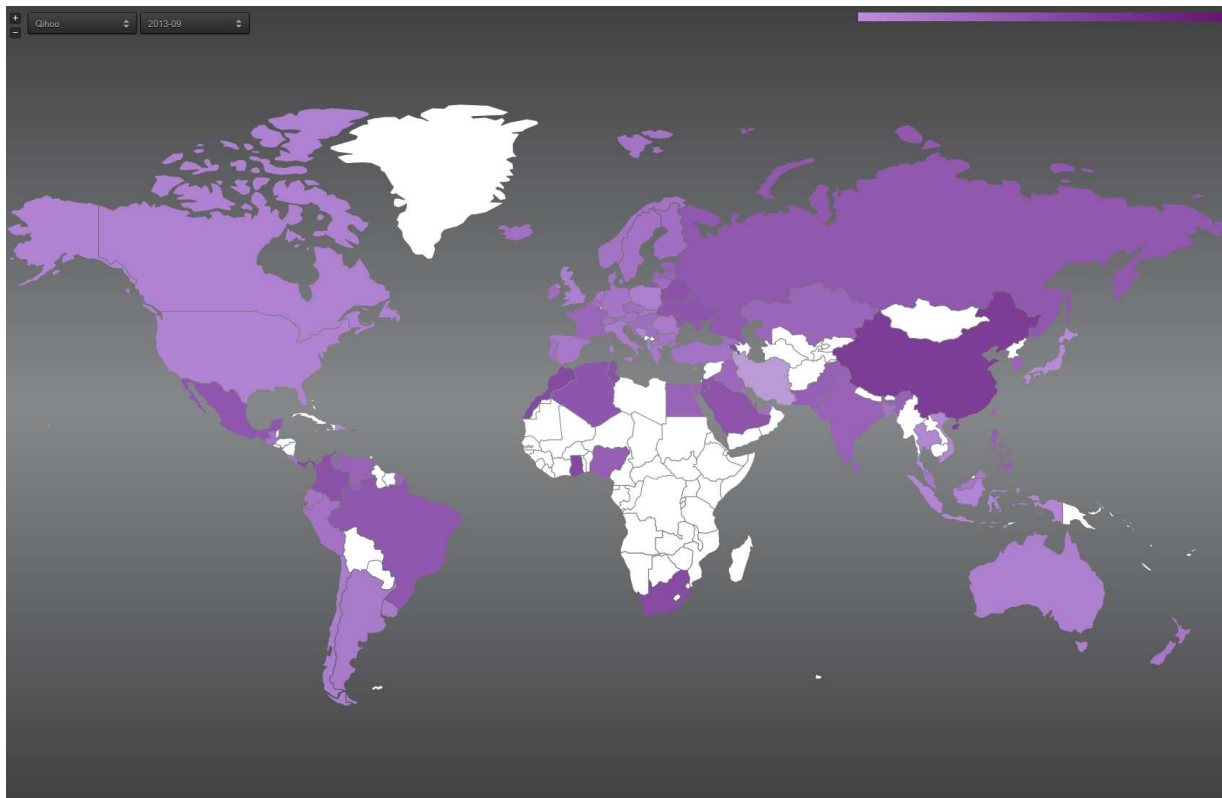
Customer Impact by Country/Region (normalised):

1. China	30 in 100000	11. Hungary	11 in 100000
2. Estonia	15 in 100000	12. Russian Federation	11 in 100000
3. South Korea	14 in 100000	13. Slovenia	11 in 100000
4. Czech Republic	14 in 100000	14. Israel	11 in 100000
5. Taiwan	14 in 100000	15. Denmark	10 in 100000
6. Iceland	14 in 100000	16. Portugal	10 in 100000
7. Hong Kong	13 in 100000	17. Slovak Republic	10 in 100000
8. Finland	13 in 100000	18. Greece	9 in 100000
9. Norway	12 in 100000	19. Austria	9 in 100000
10. Sweden	11 in 100000	20. Latvia	9 in 100000

Global Non-Detection Risk: 4 in 100000

Qihoo 360 Internet Security 4.2.0.4071

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



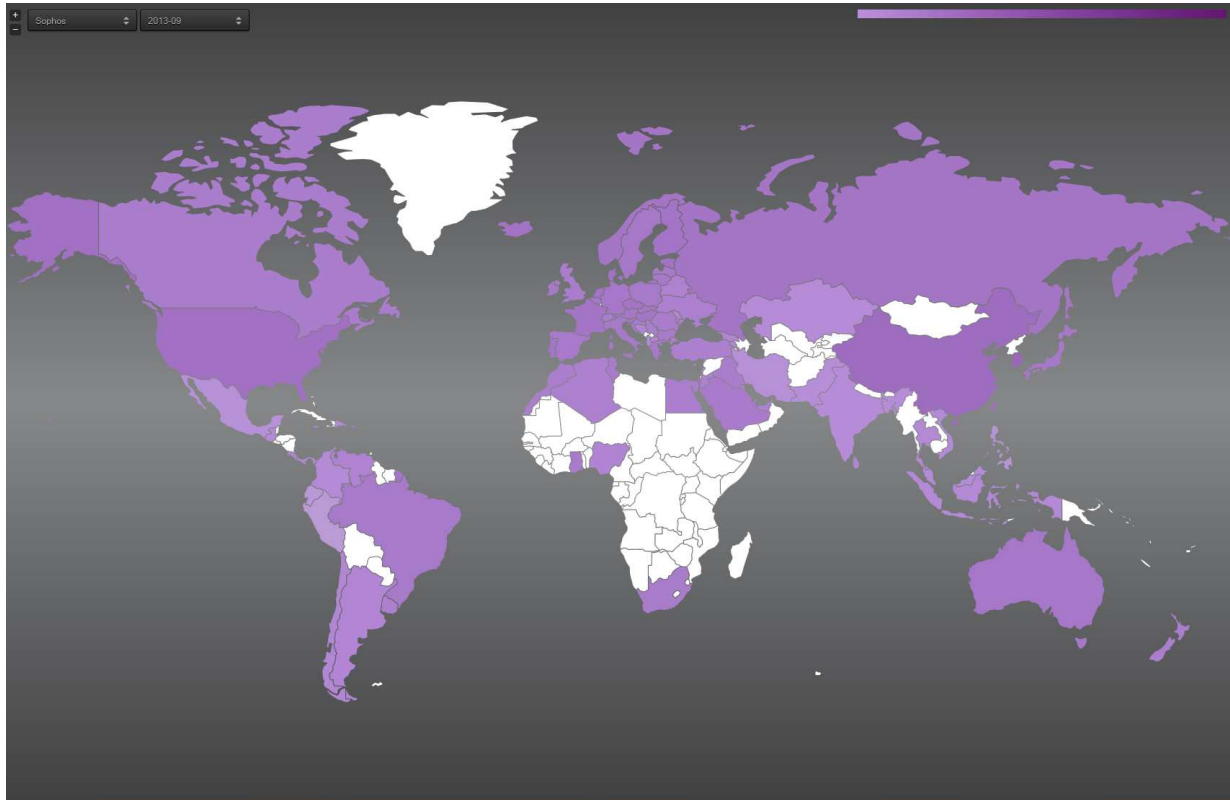
Customer Impact by Country/Region (normalised):

1. China	2126 in 100000	11. Saudi Arabia	739 in 100000
2. Panama	1552 in 100000	12. Jordan	688 in 100000
3. Ghana	1271 in 100000	13. Algeria	677 in 100000
4. Morocco	1217 in 100000	14. Puerto Rico	676 in 100000
5. South Africa	1170 in 100000	15. Ukraine	659 in 100000
6. Armenia	1140 in 100000	16. Mexico	639 in 100000
7. Colombia	837 in 100000	17. Brazil	638 in 100000
8. Belarus	835 in 100000	18. Russian Federation	582 in 100000
9. Tunisia	818 in 100000	19. Qatar	509 in 100000
10. Moldova	757 in 100000	20. Philippines	455 in 100000

Global Non-Detection Risk: 334 in 100000

Sophos Anti-Virus 10.2.8

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



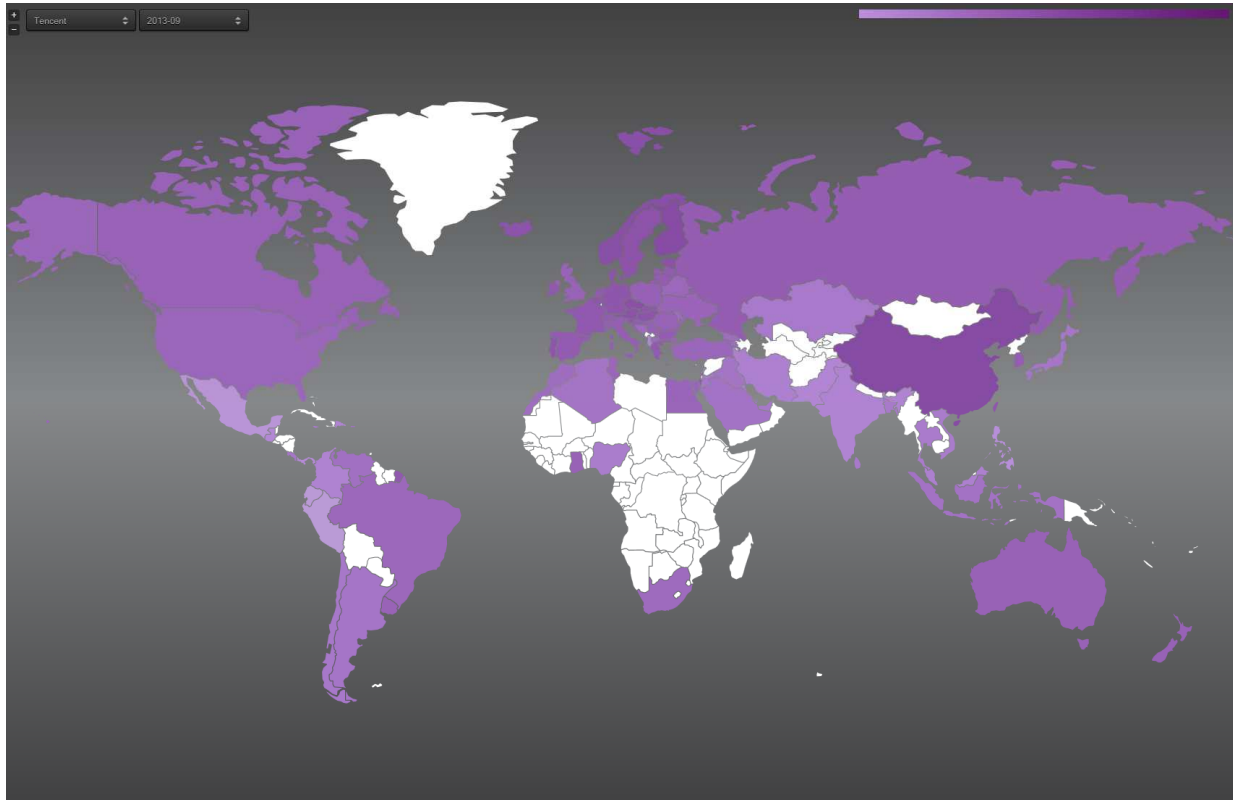
Customer Impact by Country/Region (normalised):

1. South Korea	115 in 100000	11. Hungary	52 in 100000
2. China	85 in 100000	12. Russian Federation	52 in 100000
3. Taiwan	66 in 100000	13. Netherlands	51 in 100000
4. United States	65 in 100000	14. Hong Kong	51 in 100000
5. Estonia	59 in 100000	15. France	50 in 100000
6. Iceland	57 in 100000	16. Israel	48 in 100000
7. Denmark	57 in 100000	17. Portugal	47 in 100000
8. Finland	54 in 100000	18. Belgium	46 in 100000
9. Czech Republic	53 in 100000	19. Sweden	45 in 100000
10. Norway	53 in 100000	20. Slovenia	45 in 100000

Global Non-Detection Risk: 30 in 100000

Tencent QQ PC Manager 8.1.24981.9501

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



Customer Impact by Country/Region (normalised):

1. China	1160 in 100000	11. Hungary	720 in 100000
2. Finland	1071 in 100000	12. Belgium	707 in 100000
3. Norway	944 in 100000	13. Portugal	699 in 100000
4. Czech Republic	921 in 100000	14. Taiwan	686 in 100000
5. Estonia	850 in 100000	15. Germany	685 in 100000
6. Austria	805 in 100000	16. Slovak Republic	660 in 100000
7. Sweden	803 in 100000	17. Hong Kong	652 in 100000
8. Iceland	798 in 100000	18. Ireland	610 in 100000
9. Denmark	778 in 100000	19. France	603 in 100000
10. Slovenia	739 in 100000	20. Netherlands	566 in 100000

Global Non-Detection Risk: 256 in 100000

ThreatTrack Vipre Antivirus 6.2.4.7

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



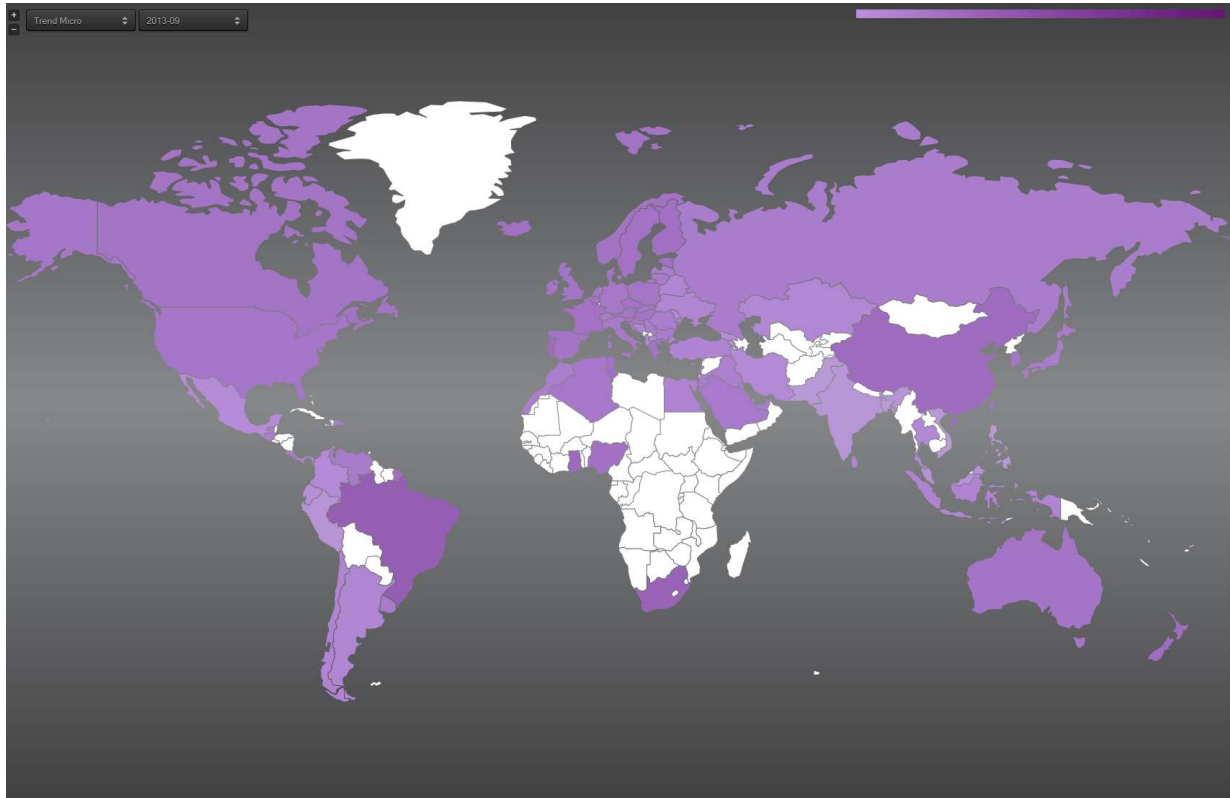
Customer Impact by Country/Region (normalised):

1. Panama	1521 in 100000	11. Mexico	620 in 100000
2. Ghana	1201 in 100000	12. Brazil	565 in 100000
3. Morocco	1166 in 100000	13. Qatar	448 in 100000
4. South Africa	1114 in 100000	14. Pakistan	430 in 100000
5. Colombia	802 in 100000	15. Nigeria	422 in 100000
6. Tunisia	715 in 100000	16. Sri Lanka	335 in 100000
7. Saudi Arabia	673 in 100000	17. India	324 in 100000
8. Puerto Rico	649 in 100000	18. Venezuela	319 in 100000
9. Jordan	633 in 100000	19. Iraq	233 in 100000
10. Algeria	626 in 100000	20. Egypt	225 in 100000

Global Non-Detection Risk: 214 in 100000

Trend Micro Titanium AntiVirus Plus 7.0.1151

The world map below shows the encounter rates across the globe based on the distribution of samples missed by this vendor:



Customer Impact by Country/Region (normalised):

1. Brazil	474 in 100000	11. Israel	202 in 100000
2. South Africa	382 in 100000	12. Finland	202 in 100000
3. Puerto Rico	363 in 100000	13. France	199 in 100000
4. Ghana	270 in 100000	14. Sweden	195 in 100000
5. Portugal	259 in 100000	15. Tunisia	193 in 100000
6. China	255 in 100000	16. Norway	191 in 100000
7. New Zealand	237 in 100000	17. Czech Republic	188 in 100000
8. Estonia	207 in 100000	18. Canada	183 in 100000
9. Iceland	203 in 100000	19. Slovenia	180 in 100000
10. Nigeria	203 in 100000	20. Denmark	178 in 100000

Global Non-Detection Risk: 121 in 100000

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