Microsoft

Microsoft Security Intelligence Report

Volume 16 | July through December, 2013

Key Findings Summary

Microsoft Security Intelligence Report, Volume 16

Volume 16 of the *Microsoft Security Intelligence Report (SIRv16)* provides in-depth perspectives on software vulnerabilities in Microsoft and third-party software, exploits, and malicious code threats. Microsoft developed these perspectives based on detailed trend analyses over the past several years, with a focus on the second half of 2013.

This document summarizes the key findings of the report.

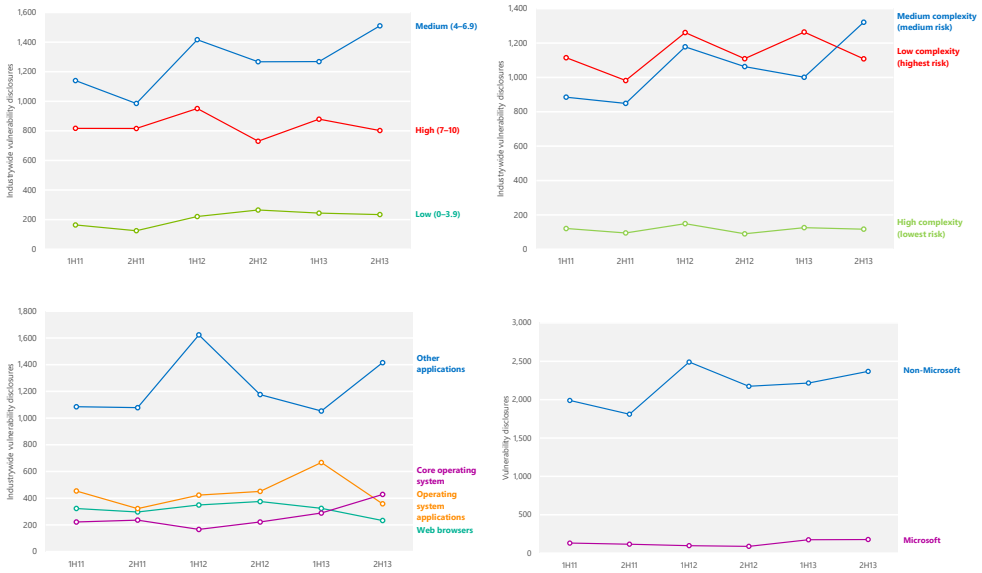
The SIR website also includes deep analysis of trends found in more than 100 countries/regions around the world and offers suggestions to help manage risks to your organization, software, and people.

You can download *SIRv16* from www.microsoft.com/sir.

Vulnerabilities

Vulnerabilities are weaknesses in software that enable an attacker to compromise the integrity, availability, or confidentiality of the software or the data that it processes. Some of the worst vulnerabilities allow attackers to exploit the compromised system by causing it to run malicious code without the user's knowledge.

Figure 1. Trends for vulnerability (CVE) severity, vulnerability complexity, disclosures by type, and disclosures for Microsoft and non-Microsoft products, across the entire software industry, 1H11–2H13[1]



- Vulnerability disclosures across the industry in 2H13 were up 6.5 percent from 1H13, and 12.6 percent from 2H12. Increased disclosures of application vulnerabilities were responsible for much of the increase. Overall, however, vulnerability disclosures remained below their recent peak level in 1H12, and well below levels seen prior to 2009, when totals of 3,500 disclosures or more per half-year period were not uncommon.

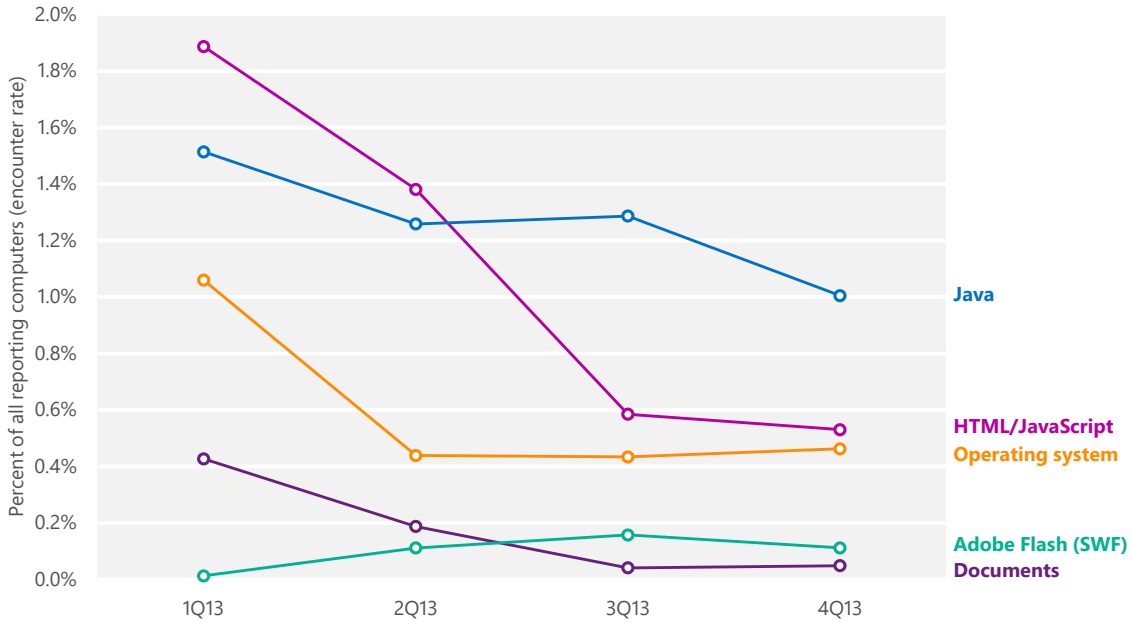
[1] Throughout the report, half-yearly and quarterly time periods are referenced using the nHyy or nQyy formats, where yy indicates the calendar year and n indicates the half or quarter. For example, 2H13 represents the second half of 2013 (July 1 through December 31), and 4Q12 represents the fourth quarter of 2012 (October 1 through December 31).

Exploits

An *exploit* is malicious code that takes advantage of software vulnerabilities to infect, disrupt, or take control of a computer without the user's consent and typically without their knowledge. Exploits target vulnerabilities in operating systems, web browsers, applications, or software components that are installed on a computer.

Figure 2 shows the prevalence of different types of exploits detected by Microsoft antimalware products in each quarter in 2013, by encounter rate. *Encounter rate* is the percentage of computers running Microsoft real-time security products that report a malware encounter. For example, the encounter rate for Java exploit attempts in 4Q13 was 1.0 percent, meaning that 1 percent of computers running Microsoft real-time security software in 4Q13 encountered Java exploit attempts, and 99 percent did not. In other words, a computer selected at random would have had about a 1 percent chance of encountering a Java exploit attempt in 4Q13.

Figure 2. Encounter rates for different types of exploit attempts in 2013



- Computers that report more than one type of exploit are counted for each type detected.

Industrywide vulnerability disclosures increased in 2H13, but high-severity vulnerabilities went down.

- Detections of individual exploits often increase and decrease significantly from quarter to quarter as exploit kit distributors add and remove different exploits from their kits. This variation can also have an effect on the relative prevalence of different exploit types, as shown in Figure 2.
- Despite decreasing each quarter, Java exploits were the most commonly encountered type of exploits in 2H13.
- Encounters with web-based (HTML/JavaScript) threats decreased by more than half in 2H13 to become the second most commonly encountered type of exploits.
- Detections of operating system, Adobe Flash, and document exploits remained mostly stable during the second half of the year.

Exploit families

Figure 3 lists the exploit-related families that were detected most often during the second half of 2013.

Figure 3. Quarterly encounter rate trends for the top exploit families detected and blocked by Microsoft real-time antimalware products in 2H13, shaded according to relative prevalence

Exploit	Platform or technology	1Q13	2Q13	3Q13	4Q13
CVE-2012-1723	Java	0.72%	0.47%	0.55%	0.32%
CVE-2010-2568 (CplLnk)	Operating system	0.31%	0.33%	0.35%	0.37%
CVE-2013-1493	Java	0.01%	0.20%	0.43%	0.24%
HTML/IframeRef*	HTML/JavaScript	0.82%	0.92%	0.35%	0.30%
CVE-2013-0422	Java	0.35%	0.27%	0.29%	0.18%
CVE-2012-0507	Java	0.39%	0.25%	0.18%	0.17%
Blacole	HTML/JavaScript	0.88%	0.35%	0.17%	0.17%
CVE-2010-0840	Java	0.12%	0.19%	0.14%	0.20%
CVE-2013-2423	Java	—	0.10%	0.15%	0.10%
CVE-2011-3544	Java	0.16%	0.13%	0.11%	0.10%

Totals for individual vulnerabilities do not include exploits that were detected as part of exploit kits.
*Totals include only IframeRef variants categorized as exploits.

- Overall, exploit encounter rates decreased significantly in 2H13.

- CVE-2012-1723, a vulnerability in the Java Runtime Environment (JRE), was the most commonly targeted vulnerability in 2H13, although it declined significantly from its peak in 1Q13. Exploits that target CVE-2012-1723 can use the vulnerability to download and run programs of the attacker's choice on the computer. CVE-2012-1723 is often exploited through drive-by downloads. (See page 18 for more information about drive-by download sites.)
- CVE-2010-2568, the second most commonly targeted vulnerability in 2H13, is a vulnerability in Windows Shell. Detections are often identified as variants in the Win32/CplLnk family, although several other malware families attempt to exploit the vulnerability as well. The vulnerability was first discovered being used by the malware family Win32/Stuxnet in mid-2010, and it has since been exploited by a number of other families, many of which predated the disclosure of the vulnerability and were subsequently adapted to attempt to exploit it. Microsoft published Security Bulletin MS10-046 in August 2010 to address the issue.

> Overall, exploit encounter rates decreased significantly in 2H13.

- Blacole is the Microsoft detection name for components of the so-called "Blackhole" exploit kit, which delivers malicious software through infected webpages. Prospective attackers buy or rent the Blacole kit on hacker forums and through other illegitimate outlets. When the attacker loads the Blacole kit on a malicious or compromised web server, visitors who don't have the appropriate security updates installed are at risk of infection through a drive-by download attack. Blacole was encountered by 0.88 percent of all reporting computers in 1Q13 but declined steeply after that, with encounter rates of just 0.17 percent in both 3Q13 and 4Q13. The Blacole kit's author, known as "Paunch," was known for frequently updating the kit with new exploits and techniques, but development of the kit halted abruptly in October 2013 following the arrest by Russian authorities of a man alleged to be Paunch.[2]

[2] "Blackhole malware exploit kit suspect arrested, *bbc.com*, October 9, 2013, http://www.bbc.com/news/technology-24456988.

Malware

Most attempts by malware to infect computers are unsuccessful. More than three-quarters of Internet-connected personal computers worldwide are protected by real-time security software that constantly monitors the computer and network traffic for threats and blocks them before they can infect the computer, if possible. Therefore, for a comprehensive understanding of the malware landscape, it's important to consider infection attempts that are blocked as well as infections that are removed.

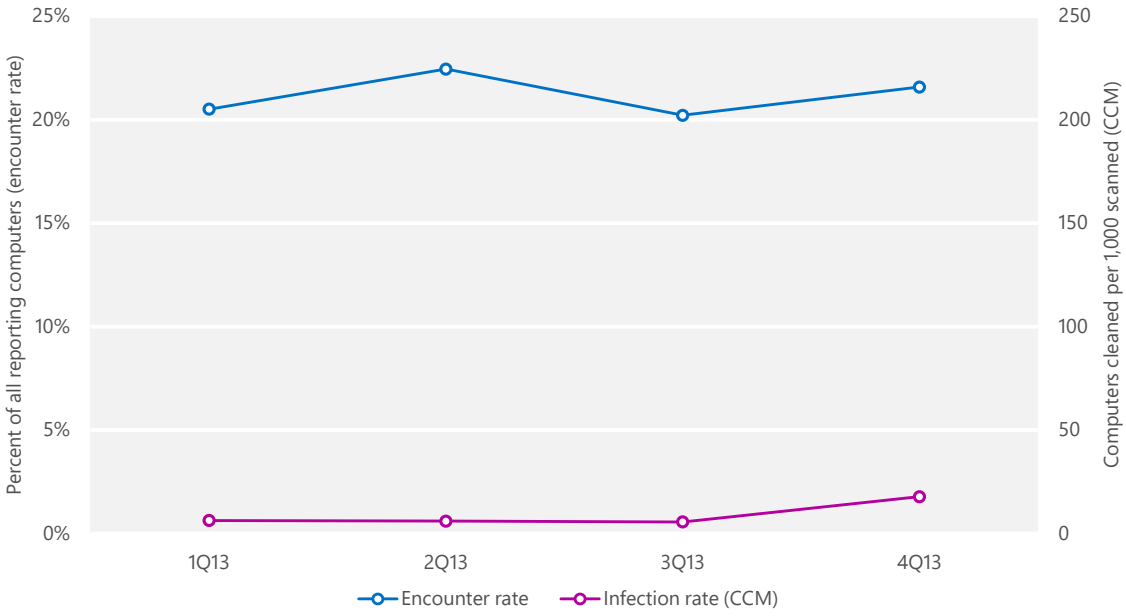
For this reason, Microsoft uses two different metrics to measure malware prevalence:[3]

- *Encounter rate* is simply the percentage of computers running Microsoft real-time security products that report a malware encounter. For example, the encounter rate for the malware family Win32/Sefnit in Germany in 3Q13 was 1.73 percent. This data means that, of the computers in Germany that were running Microsoft real-time security software in 3Q13, 1.73 percent reported encountering the Sefnit family, and 98.27 percent did not. (Only computers whose users have opted in to provide data to Microsoft are considered when calculating encounter rates.)
- *Computers cleaned per mille*, or *CCM*, is an infection rate metric that is defined as the number of computers cleaned for every 1,000 unique computers executing the Malicious Software Removal Tool (MSRT), a free tool distributed through Microsoft update services that removes more than 200 highly prevalent or serious threats from computers. Because it is not a real-time tool, the MSRT only detects and removes threats that are already present on the computer; it does not block infection attempts as they happen.

[3] Microsoft regularly reviews and refines its data collection methodology to improve its scope and accuracy. For this reason, the statistics presented in this volume of the *SIR* may differ slightly from comparable statistics in previous volumes.

Figure 4 illustrates the difference between these two metrics.

Figure 4. Worldwide encounter and infection rates in 2013, by quarter

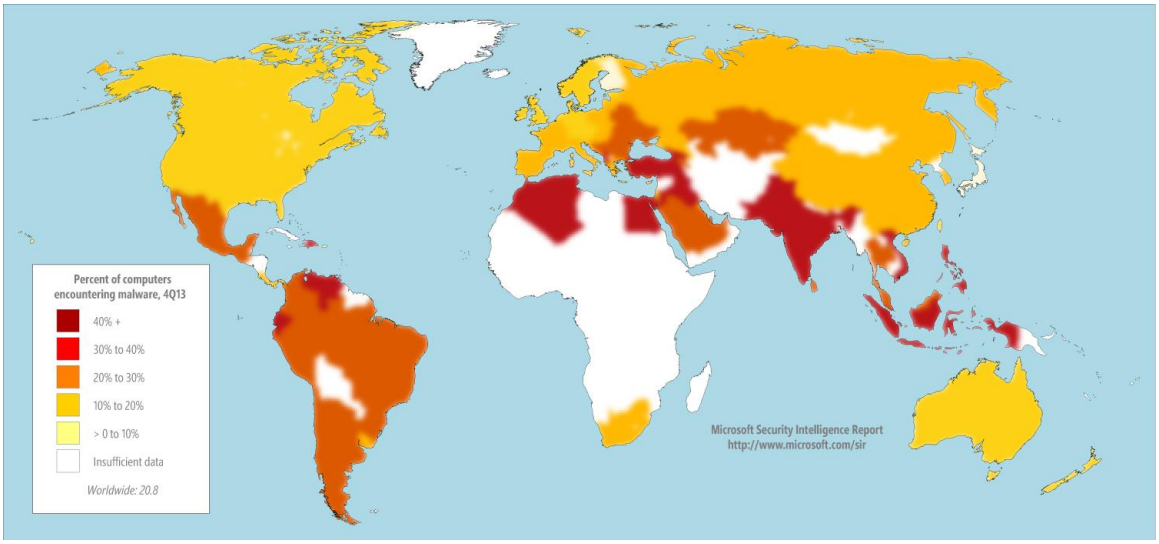


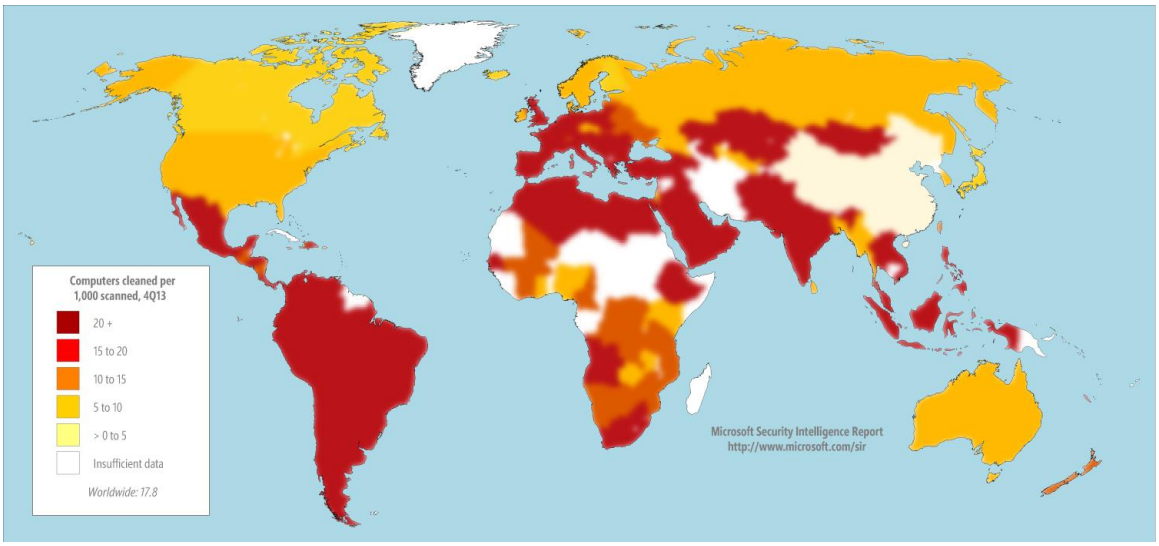
As Figure 4 shows, and as one would expect, malware encounters are much more common than malware infections. On average, about 21.2 percent of reporting computers worldwide encountered malware each quarter in 2013. At the same time, the MSRT removed malware from about 11.7 out of every 1,000 computers, or 1.17 percent. Together, encounter and infection rate information can help provide a broader picture of the malware landscape by offering different perspectives on how malware propagates and how computers get infected.

Malware prevalence worldwide

For a perspective on threat patterns worldwide, Figure 5 shows the infection and encounter rates in locations around the world in 4Q13.

Figure 5. Encounter rates (top) and infection rates (bottom) by country/region in 4Q13



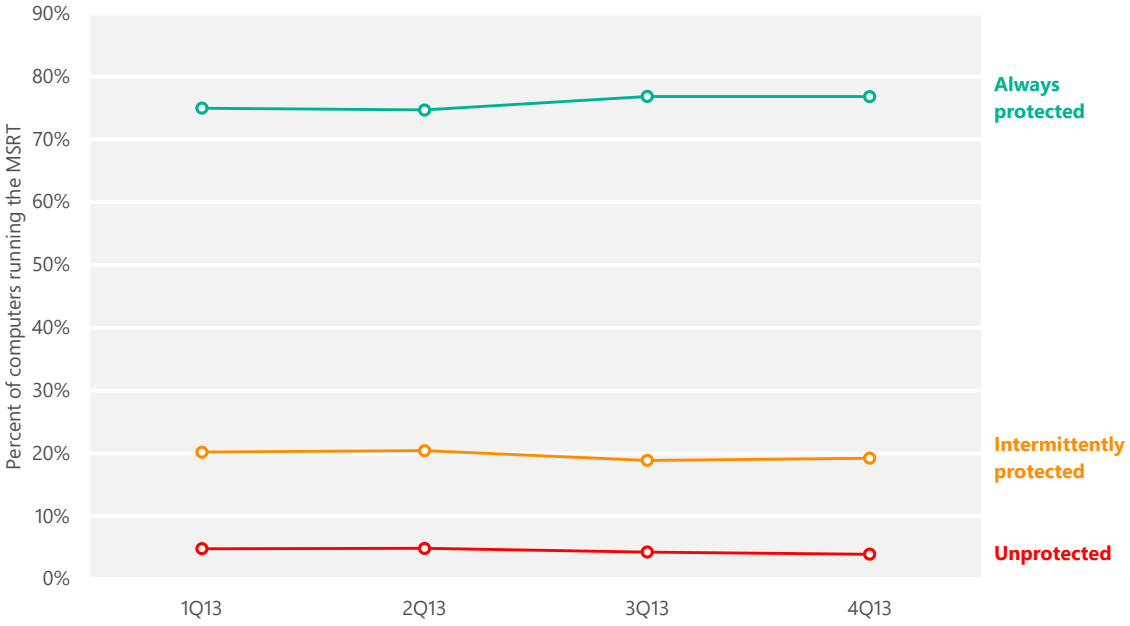


Security software use

About three-quarters of computers world-wide consistently run real-time security software.

Recent releases of the MSRT collect and report details about the state of real-time antimalware software on the computer, if the computer's administrator has chosen to opt in to provide data to Microsoft. This telemetry makes it possible to analyze security software usage patterns around the world and correlate them with infection rates. Figure 6 shows the percentage of computers worldwide that the MSRT found to be protected or unprotected by real-time security software each quarter in 2013.

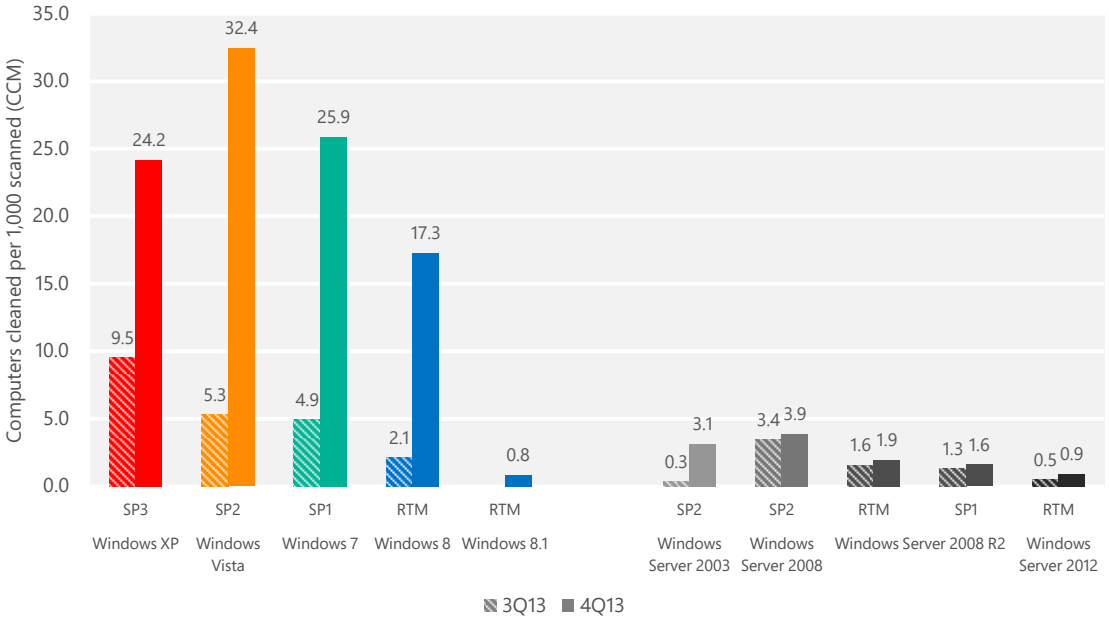
Figure 6. Percentage of computers worldwide protected by real-time security software in 2013



Infection rates by operating system

The features and updates that are available with different versions of the Windows operating system and the differences in the way people and organizations use each version affect the infection rates for the different versions and service packs. Figure 7 shows the infection rate for each currently supported Windows operating system/service pack combination.

Figure 7. Infection rate (CCM) by operating system and service pack in 3Q13 and 4Q13



SP = Service Pack. RTM = Release to manufacturing. Support for Windows XP ended April 8, 2014, after the end of 4Q13. CCM figures are expected to return to more typical levels in 2014.

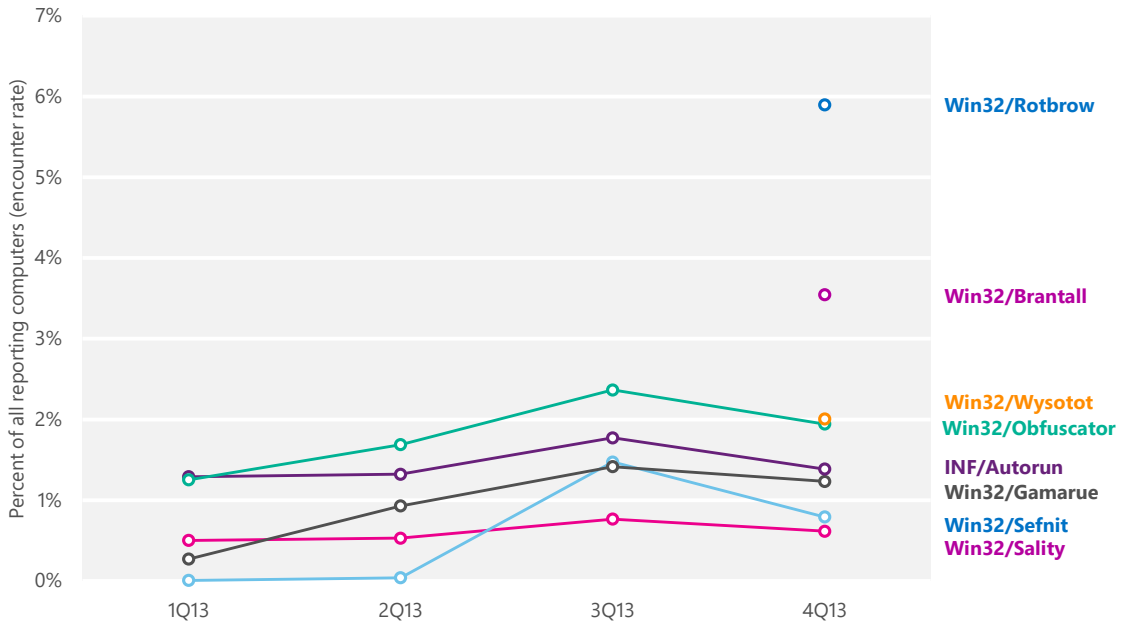
Infection rates on all platforms were many times higher in 4Q13 due to Rotbrow.

- This data is normalized; that is, the infection rate for each version of Windows is calculated by comparing an equal number of computers per version (for example, 1,000 Windows XP SP3 computers to 1,000 Windows 8 RTM computers).
- Infection rates in 4Q13 were many times higher on all supported Windows client platforms than they were in 3Q13, because of the influence of Win32/Rotbrow. CCM figures are expected to return to more typical levels in 2014.

Threat families

Figure 8 shows the detection trends for a number of families that increased or decreased significantly over the past four quarters.

Figure 8. Detection trends for a number of notable malware families in 2013



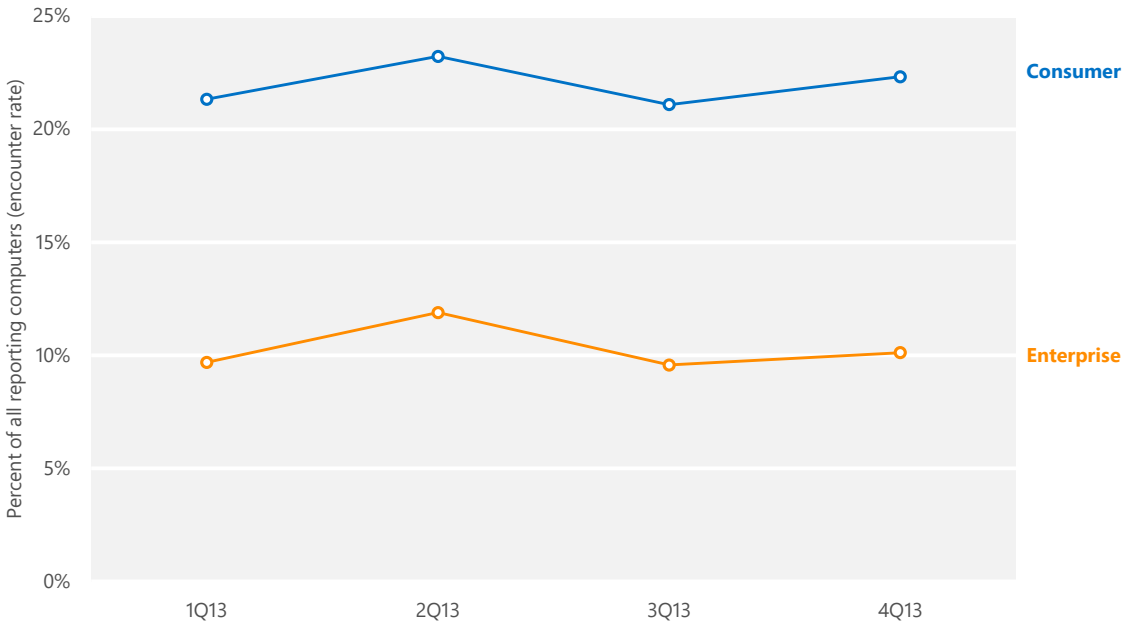
- Four of the most commonly encountered families in 2H13—Win32/Rotbrow, Win32/Brantall, Win32/Wysotot, and Win32/Sefnit—were either new or reappeared after a significant period of dormancy. See the entry "Rotbrow: The Sefnit distributor" (December 10, 2013) on the MMPC blog at blogs.technet.com/mmpc.
- Wysotot is a family of trojans that change the start page of the user's web browser. It is usually installed by software bundlers that advertise free software or games. Wysotot was first detected in October 2013, and detection signatures were added to the MSRT in March 2014. For more information about Wysotot, see the entry "MSRT March 2014 – Wysotot" (March 11, 2014) in the MMPC blog at blogs.technet.com/mmpc.

> Four of the top families in 2H13 were new or reappeared after a significant period of dormancy.

Home and enterprise threats

The usage patterns of home users and enterprise users tend to be very different. Analyzing these differences can provide insights into the different ways attackers target enterprise and home users and which threats are more likely to succeed in each environment.

Figure 9. Malware encounter rates for consumer and enterprise computers in 2013



- Enterprise environments typically implement defense-in-depth measures, such as enterprise firewalls, that prevent a certain amount of malware from reaching users' computers. Consequently, enterprise computers tend to encounter malware at a lower rate than consumer computers. As Figure 9 shows, the encounter rate for consumer computers was about 2.2 times as high as the rate for enterprise computers in both 3Q13 and 4Q13.

Figure 10 and Figure 11 list the top 10 families detected on domain-joined and non-domain computers, respectively, in 2H13.

Figure 10. Quarterly trends for the top 10 families detected on domain-joined computers in 2H13, by percentage of computers encountering each family

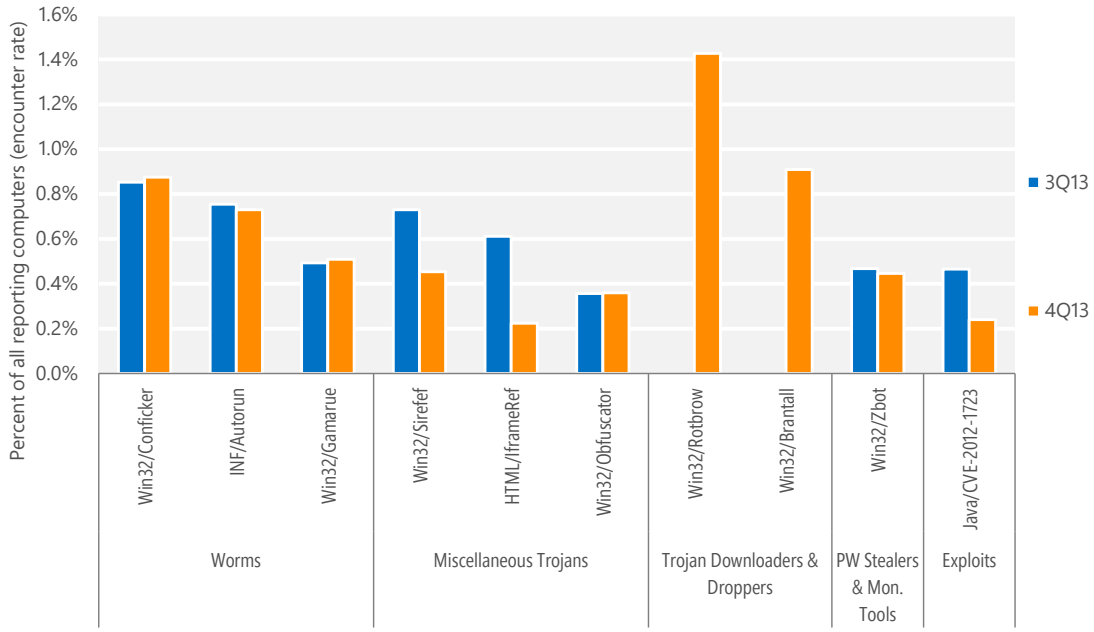
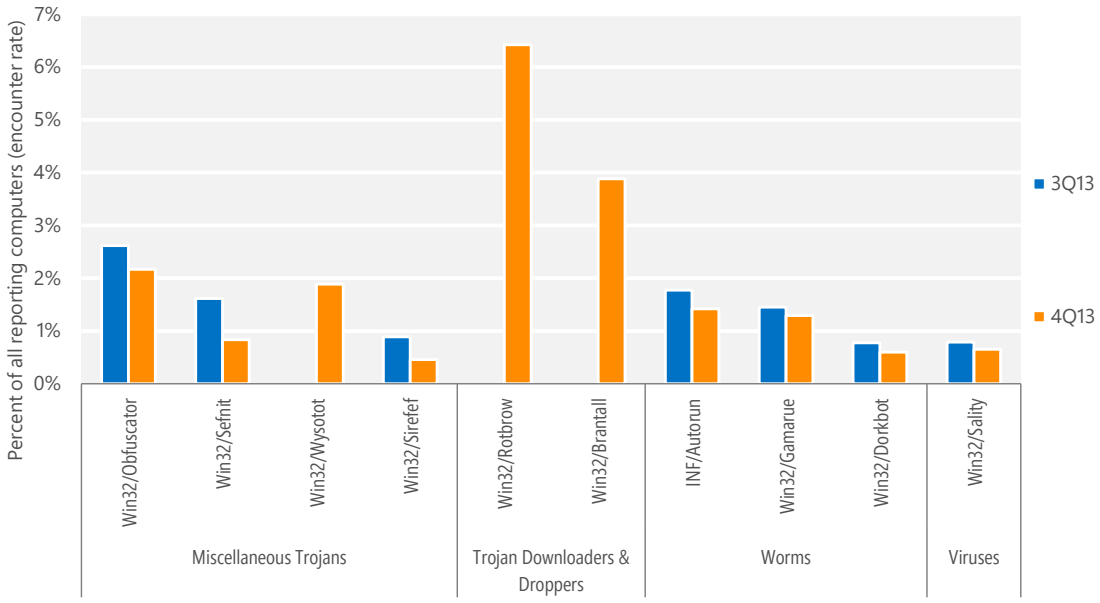


Figure 11. Quarterly trends for the top 10 families detected on non-domain computers in 2H13, by percentage of computers encountering each family



- Five threats—INF/Autorun, Win32/Brantall, Win32/Gamarue, Win32/Obfuscator, and Win32/Rotbrow—were common to both lists. All were more frequently encountered on non-domain computers than on

domain-joined computers. See "Threat families" on page 10 for more information about these families.

The usage patterns of home users and enterprise users tend to be very different.

- Win32/Conficker, the most commonly encountered family on domain-joined computers in 2H13, is a worm that spreads by exploiting a vulnerability addressed by Security Bulletin MS08-067. It can also spread via network shares and removable drives, which are commonly used in domain environments.
- Win32/Sefnit, the 6th most commonly encountered famiy on non-domain computers in 2H13, became significantly more active in 3Q13 after a long period of dormancy. Sefnit is a bot that allows a remote attacker to use the computer to perform various activities, using the Tor anonymity network to issue commands to the botnet.

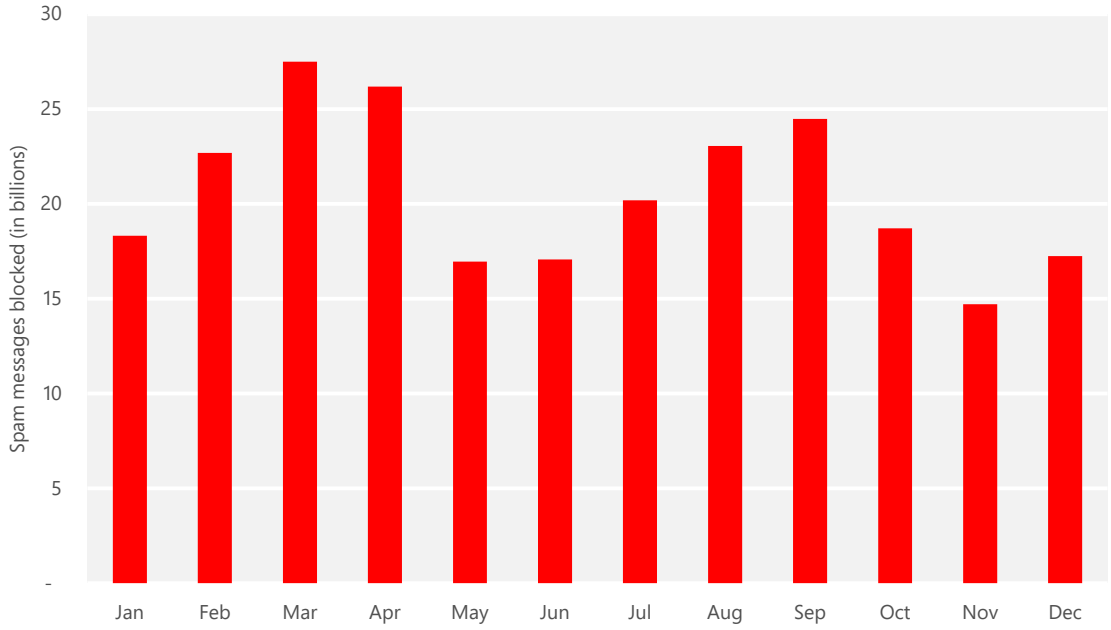
Email threats

More than 75 percent of the email messages sent over the Internet are unwanted. Not only does all this unwanted email tax recipients' inboxes and the resources of email providers, but it also creates an environment in which emailed malware attacks and phishing attempts can proliferate.

Spam messages blocked

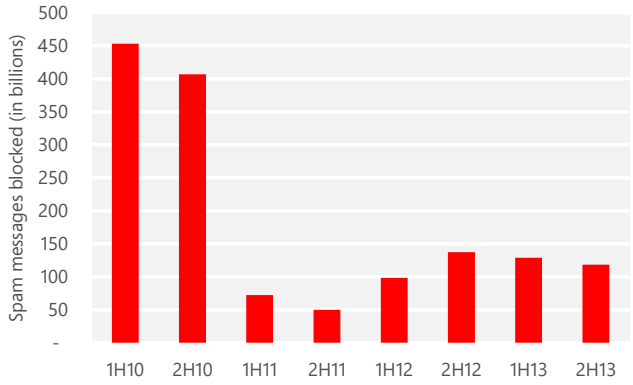
The information in this section of the *Microsoft Security Intelligence Report* is compiled from telemetry data provided by Exchange Online Protection, which provides spam, phishing, and malware filtering services. Exchange Online Protection is used by tens of thousands of Microsoft enterprise customers that process tens of billions of messages each month.

Figure 12. Messages blocked by Exchange Online Protection in 2013, by month



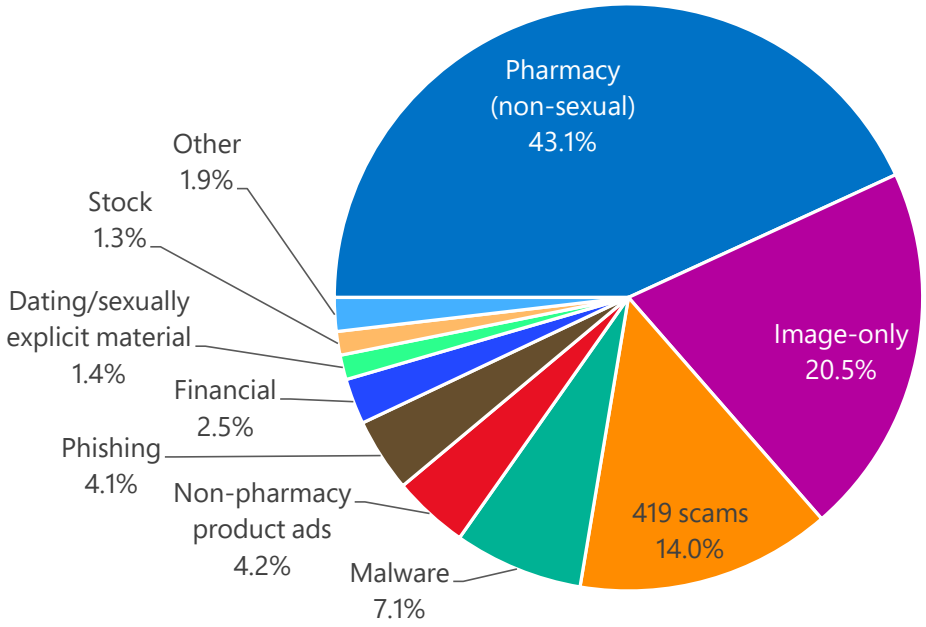
- Blocked mail volumes in 2H13 were consistent with 1H13, and remain well below levels seen prior to the end of 2010, as shown in Figure 13. The dramatic decline in spam observed since 2010 has occurred in the wake of successful takedowns of a number of large spam-sending botnets, notably

Figure 13. Messages blocked by Exchange Online Protection each half-year period, 1H10–2H13



Cutwail (August 2010) and Rustock (March 2011).[4] In 2H13, Exchange Online Protection determined that about 1 in 4 email messages did not require blocking or filtering, compared to just 1 in 33 messages in 2010.

Figure 14. Inbound messages blocked by Exchange Online Protection filters, July–October 2013, by category



[4] For more information about the Cutwail takedown, see Microsoft Security Intelligence Report, Volume 10 (July-December 2010). For more information about the Rustock takedown, see "Battling the Rustock Threat," available from the Microsoft Download Center.

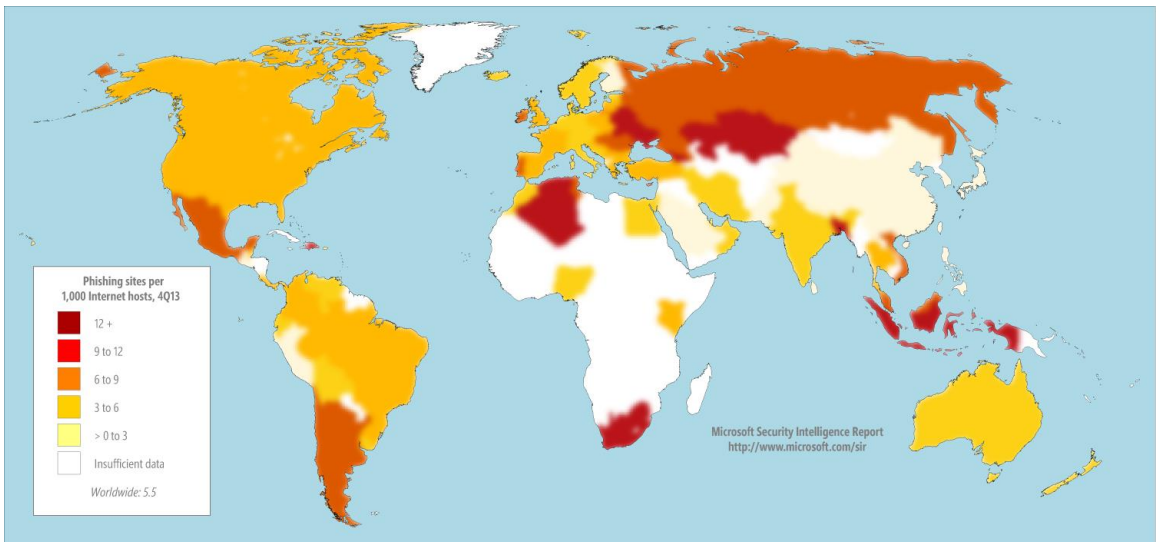
Malicious websites

Attackers often use websites to conduct phishing attacks or distribute malware. Malicious websites typically appear to be completely legitimate, and provide no outward indicators of their malicious nature even to experienced computer users.

Global distribution of phishing sites

Phishing sites are hosted all over the world on free hosting sites, on compromised web servers, and in numerous other contexts. Performing geographic lookups of IP addresses in the database of reported phishing sites makes it possible to create maps that show the geographic distribution of sites and to analyze patterns.

Figure 15. Phishing sites per 1,000 Internet hosts for locations around the world in 4Q13



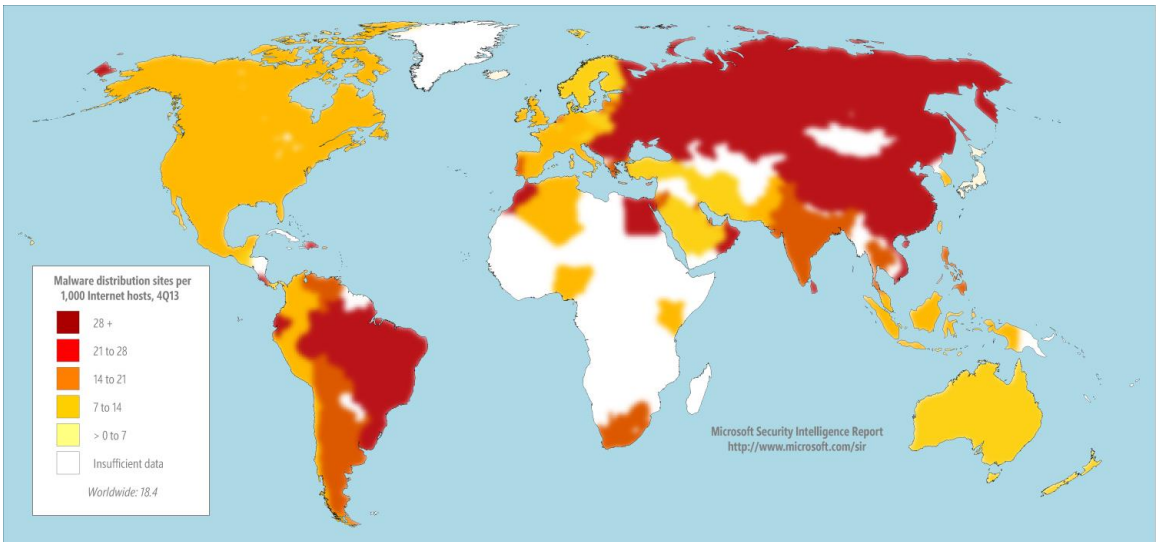
- SmartScreen Filter detected 5.5 phishing sites per 1,000 Internet hosts worldwide in 4Q13.
- Locations with higher than average concentrations of phishing sites include Ukraine (14.2 per 1,000 Internet hosts in 4Q13), Indonesia (12.8), and South Africa (12.5). Locations with low concentrations of phishing sites include Taiwan (1.4), Japan (1.4), and Korea (1.6).

Malware hosting sites

SmartScreen Filter in Internet Explorer helps provide protection against sites that are known to host malware, in addition to phishing sites. SmartScreen Filter uses file and URL reputation data and Microsoft antimalware technologies to determine whether sites distribute unsafe content.

Global distribution of malware hosting sites

Figure 16. Malware distribution sites per 1,000 Internet hosts for locations around the world in 4Q13

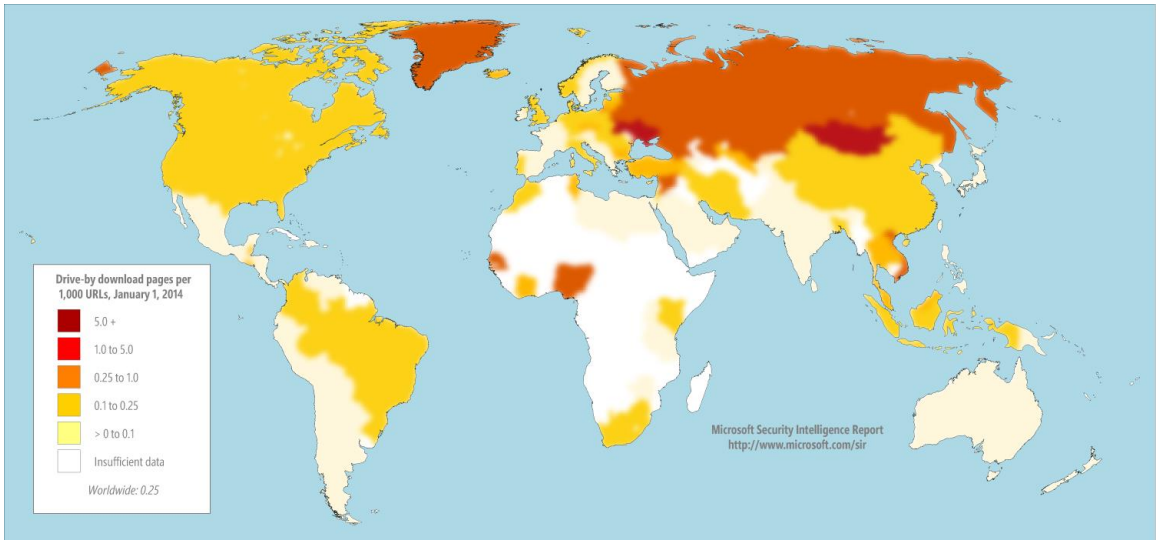


- Sites that host malware were significantly more common than phishing sites in 2H13. SmartScreen Filter detected 18.4 malware hosting sites per 1,000 Internet hosts worldwide in 4Q13.
- China, which had a lower than average concentration of phishing sites (2.3 phishing sites per 1,000 Internet hosts in 4Q13), also had a very high concentration of malware hosting sites (35.8 malware hosting sites per 1,000 hosts in 4Q13). Other locations with large concentrations of malware hosting sites included Ukraine (59.2), Romania (57.8), and Russia (41.0). Locations with low concentrations of malware hosting sites included Japan (6.7), New Zealand (7.6), and Finland (8.8).

Drive-by download sites

A *drive-by download* site is a website that hosts one or more exploits that target vulnerabilities in web browsers and browser add-ons. Users with vulnerable computers can be infected with malware simply by visiting such a website, even without attempting to download anything.

Figure 17. Drive-by download pages indexed by Bing at the end of 4Q13 per 1,000 URLs in each country/region



This document summarizes the key findings of the report. The *SIR* website also includes deep analysis of trends found in more than 100 countries/regions around the world and offers suggestions to help manage risks to your organization, software, and people.

You can download *SIRv16* from www.microsoft.com/sir.

One Microsoft Way
Redmond, WA 98052-6399
microsoft.com/security