Microsoft Security Intelligence Report

Volume 21 | January through June, 2016

Key Findings Summary

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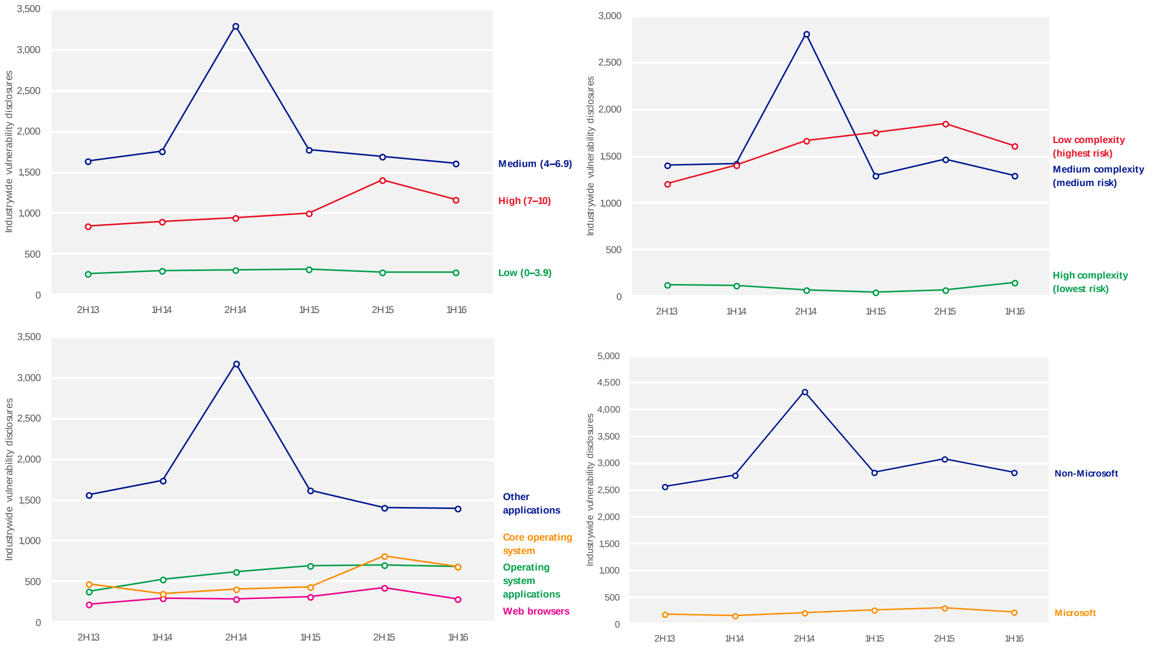
Vulnerabilities

Vulnerability disclosures across the industry decreased 9.8 percent between 2H15 and 1H16, to just above 3,000.[1] Disclosures have trended generally upward over the past three years, with the exception of a spike in 2H14 caused by a CERT/CC research project involving SSL vulnerabilities in Android applications.

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, 2H13–1H16

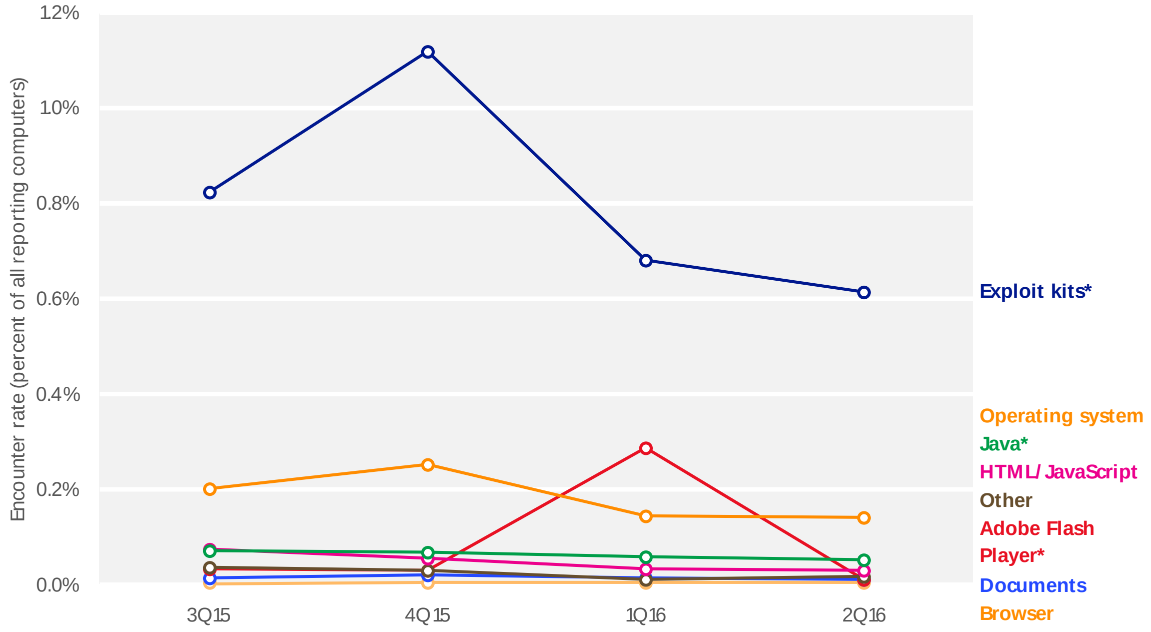


[1] Throughout the report, half-yearly and quarterly time periods are referenced using the *n*H*yy* or *n*Q*yy* formats, where yy indicates the calendar year and n indicates the half or quarter.

Exploits

Figure 2 shows the prevalence of different types of exploits detected by Microsoft antimalware products each quarter from 3Q15 to 2Q16, by encounter rate. *Encounter rate* is the percentage of computers running Microsoft real-time security products that report a malware encounter.

Figure 2. Encounter rates for different types of exploit attempts, 3Q15-2Q16



Computers that report more than one type of exploit are counted for each type detected. * Figures for exploit kits, Java, and Adobe Flash Player exploits are affected by IExtensionValidation in Internet Explorer, which blocks many threats before they are encountered. See the full report for more information.

- After increasing significantly between 3Q15 and 4Q15, encounters with exploit kits decreased by more than a third from 4Q15 to 1Q16. They remained the most commonly encountered type of exploit in the second half of the year, with an encounter rate more than four times that of the next most common type of exploit. See the full report for more information about these exploits.

- Exploit attempts involving Adobe Flash Player increased significantly in 1Q16 with the appearance of SWF/Netis, then returned to much lower levels in 2Q16 as Netis encounters decreased.
- The number of encounters with exploits that target operating systems decreased slightly during both quarters in 1H16, but ended the period in second place as Flash exploits receded. See the full report for more information.
- Encounters with Java exploits, HTML/JavaScript exploits, and other types of exploits each accounted for less than 0.1 percent of all malware encounters in 1H16. See the remainder of this section for more information about these exploits.

Exploit families

Figure 3 lists the exploit-related malware families that were detected most often during the first half of 2016.

Figure 3. Quarterly encounter rate trends for the exploit families most commonly detected and blocked by Microsoft real-time antimalware products in 1H16, shaded according to relative prevalence

Exploit	Type	3Q15	4Q15	1Q16	2Q16
JS/Axpergle	Exploit kit	0.71%	0.92%	0.53%	0.40%
SWF/Netis	Adobe Flash Player	0.00%	0.00%	0.27%	0.00%
CVE-2010-2568 (CplLnk)	Operating system	0.18%	0.24%	0.13%	0.13%
HTML/Meadgive	Exploit kit	0.07%	0.17%	0.08%	0.10%
JS/NeutrinoEK	Exploit kit	0.01%	0.11%	0.04%	0.10%
HTML/IframeRef	Generic	0.04%	0.05%	0.03%	0.02%
ShellCode	Adobe Flash Player	0.01%	0.03%	0.02%	0.02%
SWF/Dlcypt	Adobe Flash Player	—	—	0.01%	0.01%
JS/Anogre	Exploit kit	0.01%	0.01%	0.01%	0.01%
Win32/Pdfjsc	Documents	0.01%	0.01%	0.01%	0.00%

Totals shown in the table for individual vulnerabilities do not include exploits that were detected as part of exploit kits.

- Exploit kits accounted for four of the 10 most commonly encountered exploit detections during 1H16.
- SWF/Netis uses a critical vulnerability in Adobe Flash Player (CVE-2015-5119) to download and run files on the infected computer. Adobe released Security Bulletin APSB15-16 in July 2015 to address the issue.
- CVE-2010-2568 is a vulnerability in Windows Shell. Detections are often identified as variants in the Win32/CplLnk family, although several other malicious software families attempt to exploit the vulnerability as well. An attacker exploits CVE-2010-2568 by creating a malformed shortcut file—typically distributed through social engineering or other methods—that forces a vulnerable computer to load a malicious file when the shortcut icon is displayed in File Explorer. 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. Windows 8 and subsequently released versions of Windows have never been vulnerable to exploits of CVE-2010-2568.

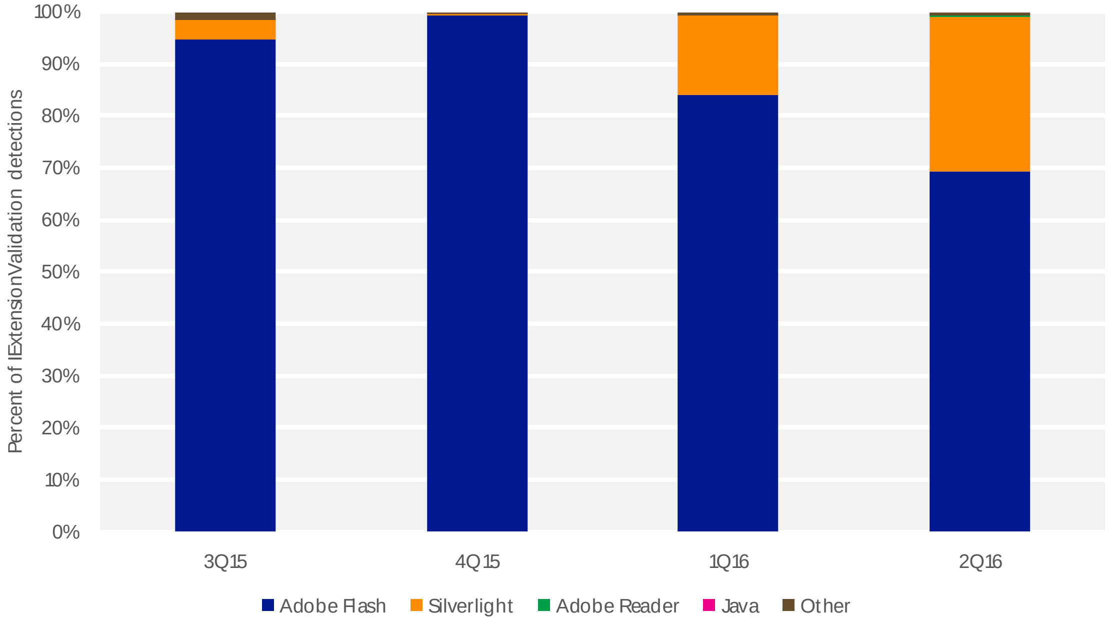
- HTML/IframeRef is a generic detection for specially formed HTML inline frame (IFrame) tags that redirect to remote websites that contain malicious content. More properly considered exploit downloaders than true exploits, these malicious pages use a variety of techniques to exploit vulnerabilities in browsers and plug-ins. The only commonality is that the attacker uses an inline frame to deliver the exploits to users. The exact exploit delivered and detected by one of these inline frames might be changed frequently.
- SWF/Dlcypt is an Adobe Flash Player file that may be used by attackers to decrypt and execute encrypted JavaScript files. It is configured to a run with a frame size of zero by zero pixels, which allows it to run without being noticed.

Exploit detection with Internet Explorer and IExtensionValidation

IExtensionValidation is an interface introduced in Internet Explorer 11 that real-time security software can implement to block ActiveX controls from loading on malicious pages. (Microsoft Edge, the newest Microsoft web browser and the default browser in Windows 10, does not support ActiveX plug-ins at all, and therefore does not use IExtensionValidation.) When Internet Explorer loads a webpage that includes ActiveX controls, if the security software has implemented IExtensionValidation, the browser calls the security software to scan the HTML and script content on the page before loading the controls themselves. If the security software determines that the page is malicious (for example, if it identifies the page as an exploit kit landing page), it can direct Internet Explorer to prevent individual controls or the entire page from loading.

Figure 4 shows the types of ActiveX controls identified on malicious webpages in Internet Explorer 11 for each quarter from 3Q15 to 2Q16.

Figure 4. ActiveX controls detected on malicious webpages through IExtensionValidation, 3Q15–2Q16, by control type



- Adobe Flash Player objects were the most commonly detected type of object hosted on malicious pages in each of the past four quarters, reaching a high of 99.2 percent in 4Q15 before declining to 69.3 percent in 2Q16.
- Pages hosting malicious Silverlight objects increased in 1H16 as several exploit kits added exploits for two recently disclosed Silverlight vulnerabilities, CVE-2015-1671 and CVE-2016-0034. Microsoft published Security Bulletins MS15-044 in May 2015 and MS16-006 in January 2016, respectively, to address the vulnerabilities.

Malware and unwanted software

Microsoft uses two different metrics to measure malware and unwanted software prevalence:[2]

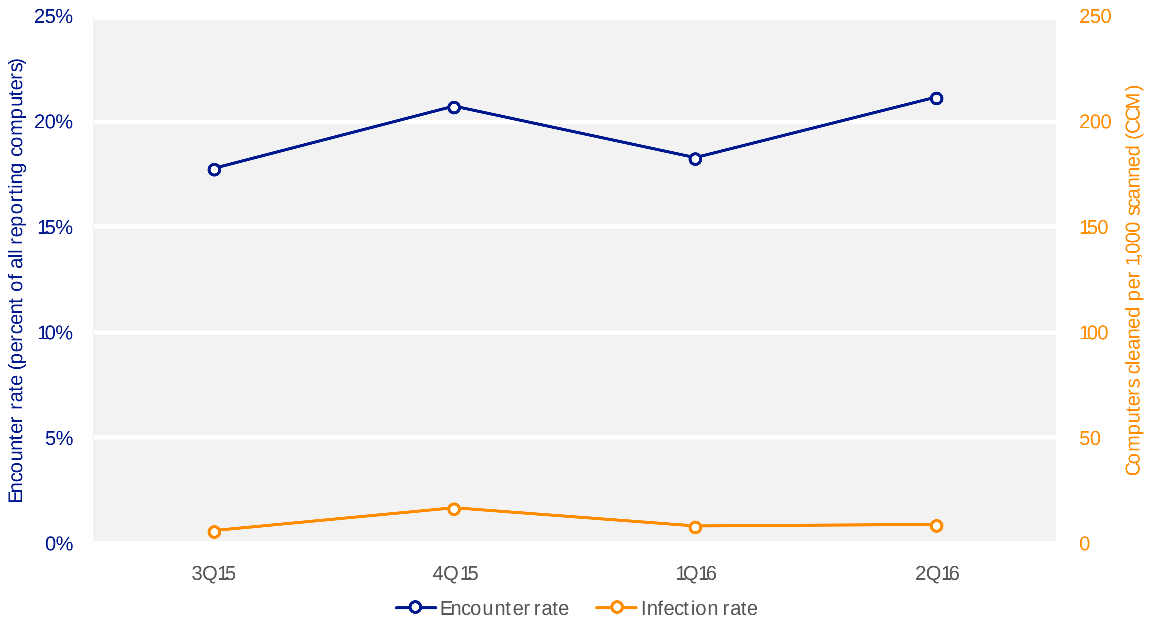
- *Encounter rate* is simply the percentage of computers running Microsoft real-time security products that report a malware encounter.[3] Only computers whose users have opted in to provide data to Microsoft are considered when calculating encounter rates.
- *Computers cleaned per mille*, or *CCM*, is an infection rate metric that is defined as the number of computers cleaned for every 1,000 unique computers that run 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.

Figure 5 illustrates the difference between these two metrics.

[2] Encounter and infection rate figures do not include the Brantall, Rotbrow, and Filcout families. See the full report for more information.

[3] Encounter rate does not include threats that are blocked by a web browser before being detected by antimalware software. In particular, IExtensionValidation in Internet Explorer 11 enables security software to block pages containing exploits from loading. (See the full report for more information.) For this reason, encounter rate figures may not fully reflect all of the threats encountered by computer users.

Figure 5. Worldwide encounter and infection rates, 3Q15–2Q16, by quarter

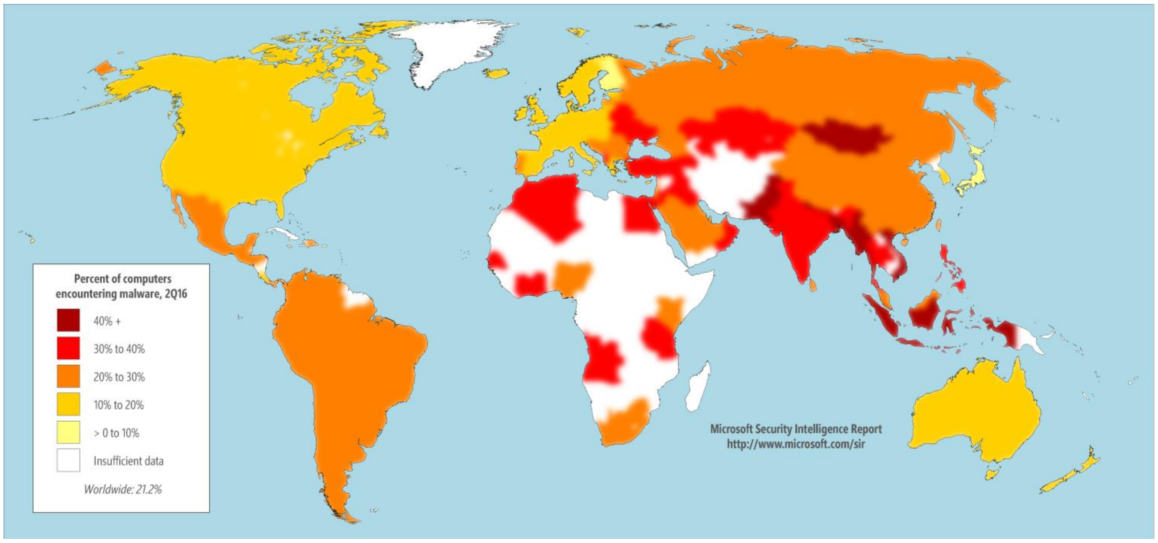


On average, about 20.6 percent of reporting computers worldwide encountered threats over the past four quarters. At the same time, the MSRT removed threats from about 10.1 out of every 1,000 computers, or 1.01 percent.

Malware and unwanted software worldwide

Figure 6 shows the infection and encounter rates for locations around the world in 2Q16.

Figure 6. Encounter rates (top) and infection rates (bottom) by country/region in 2Q16


Percent of computers encountering malware, 2Q16
40% +
30% to 40%
20% to 30%
10% to 20%
> 0 to 10%
Insufficient data
Worldwide: 21.2%
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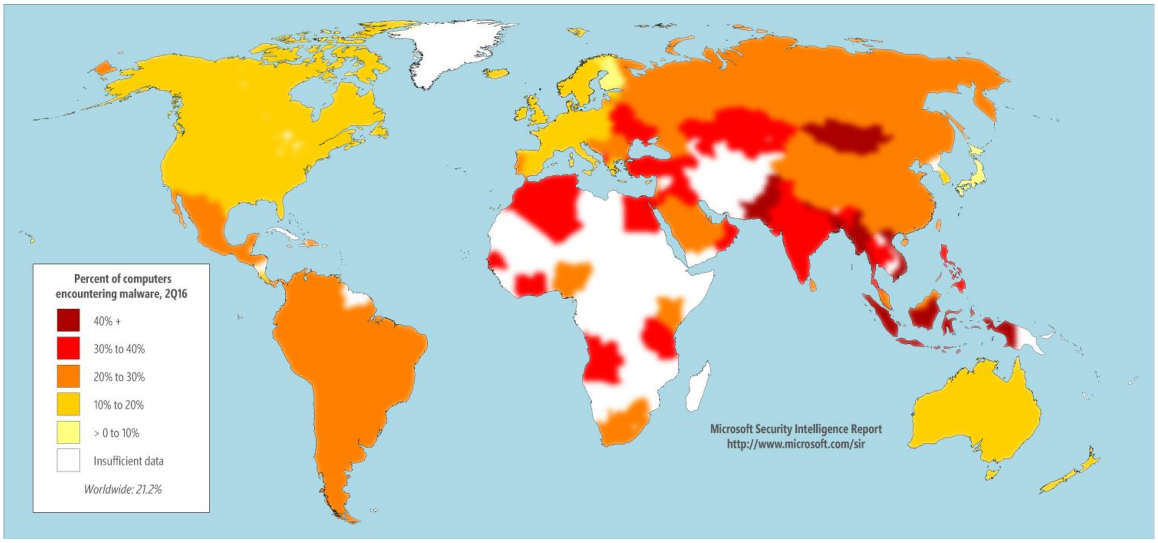
Percent of computers encountering malware, 2Q16
40% +
30% to 40%
20% to 30%
10% to 20%
> 0 to 10%
Insufficient data
Worldwide: 21.2%
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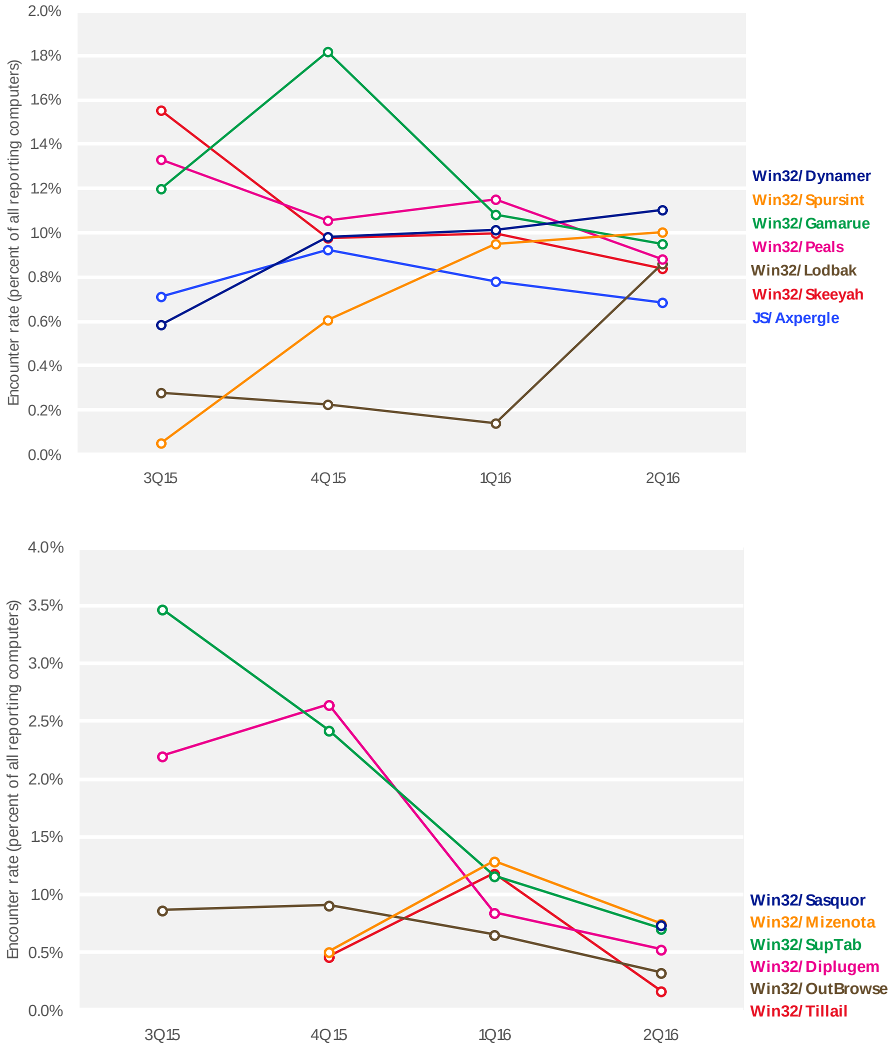
Threat families

Figure 7 shows trends for the top malware and unwanted software families that were detected on computers by Microsoft real-time antimalware products worldwide in 1H15.

Figure 7. Encounter rate trends for a number of notable malware families (top) and unwanted software families (bottom) in 1H16

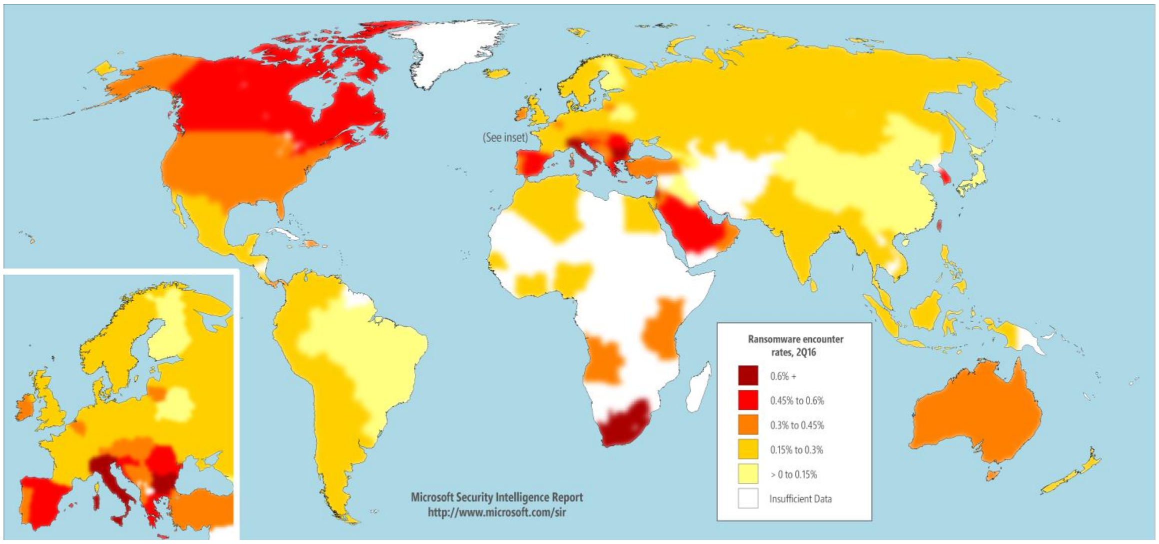


- Win32/Dynamer, Win32/Peals, and Win32/Skeeyah are generic detections for a variety of threats that share certain characteristics.
- Win32/Gamarue, the most commonly encountered non-generic threat in 1H16, is a worm that is commonly distributed via exploit kits and social engineering.

Ransomware

Ransomware is a type of malware that is designed to render a computer or its files unusable until the computer user pays a certain amount of money to the attacker or takes other actions.

Figure 8. Encounter rates for ransomware families by country/region in 2Q16

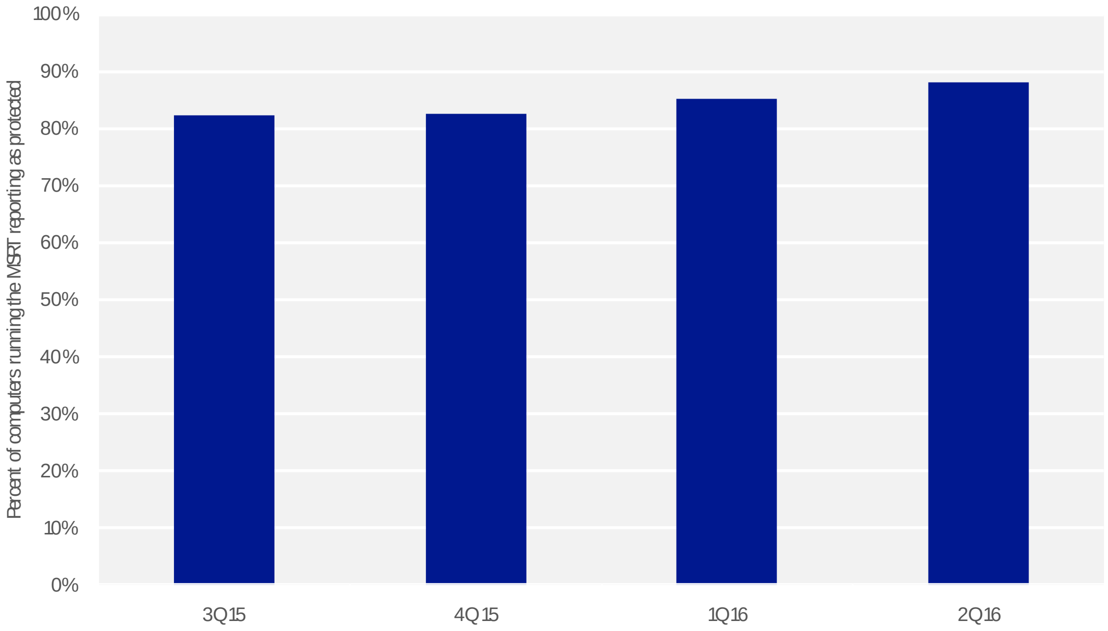

(See inset)
Ransomware encounter rates, 2Q16
0.6% +
0.45% to 0.6%
0.3% to 0.45%
0.15% to 0.3%
> 0 to 0.15%
Insufficient Data
Microsoft Security Intelligence Report
http://www.microsoft.com/sir

The location with the highest ransomware encounter rate in 2Q16 was Italy (0.82 percent), followed by Bulgaria (0.74 percent) and Taiwan (0.67 percent).

Security software use

Recent releases of the MSRT collect and report details about the state of real-time antimalware software on a computer. Figure 9 shows the percentage of computers worldwide that the MSRT found to be running up-to-date real-time security software each quarter in 2H15 and 1H16.

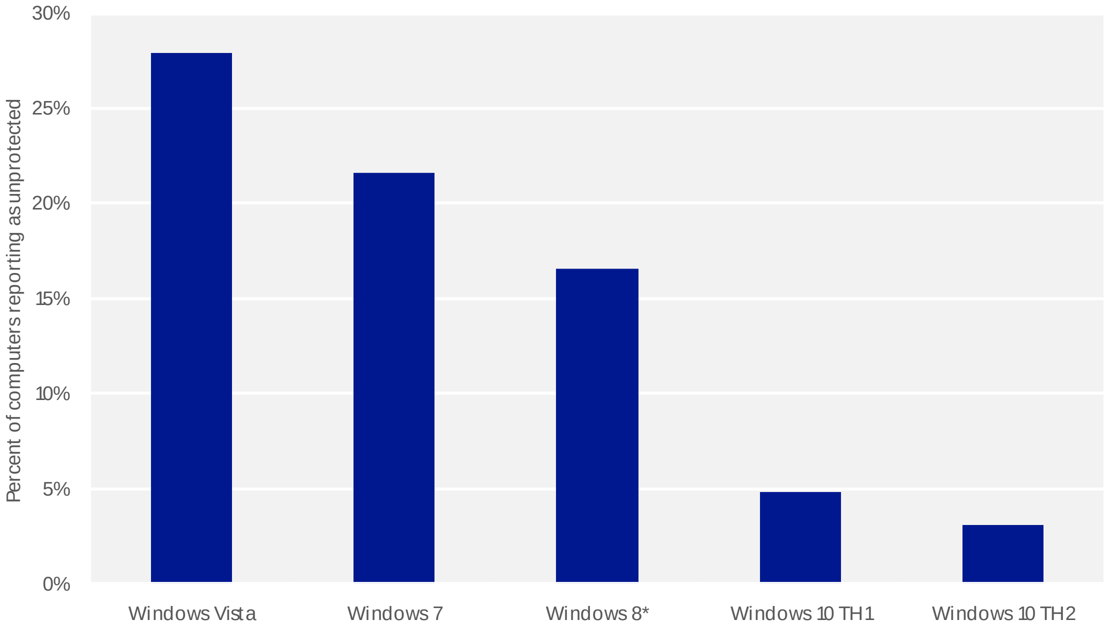
Figure 9. Average monthly percentage of computers reporting security software enabled, 3Q15–2Q16



- More than 80 percent of computers reported having real-time security software enabled during each of the past four quarters, increasing to 88 percent by 2Q16. Much of the increase corresponds to increased adoption of Windows 10, which comes with Windows Defender installed and automatically enabled if no other security software is present, replacing installations of older versions of Windows that did not have this feature.

Protection rates can also vary by operating system, as shown in Figure 10.

Figure 10. Average monthly security software protection state for supported client versions of Windows in 1H16, by quarter



* Includes Windows 8.1

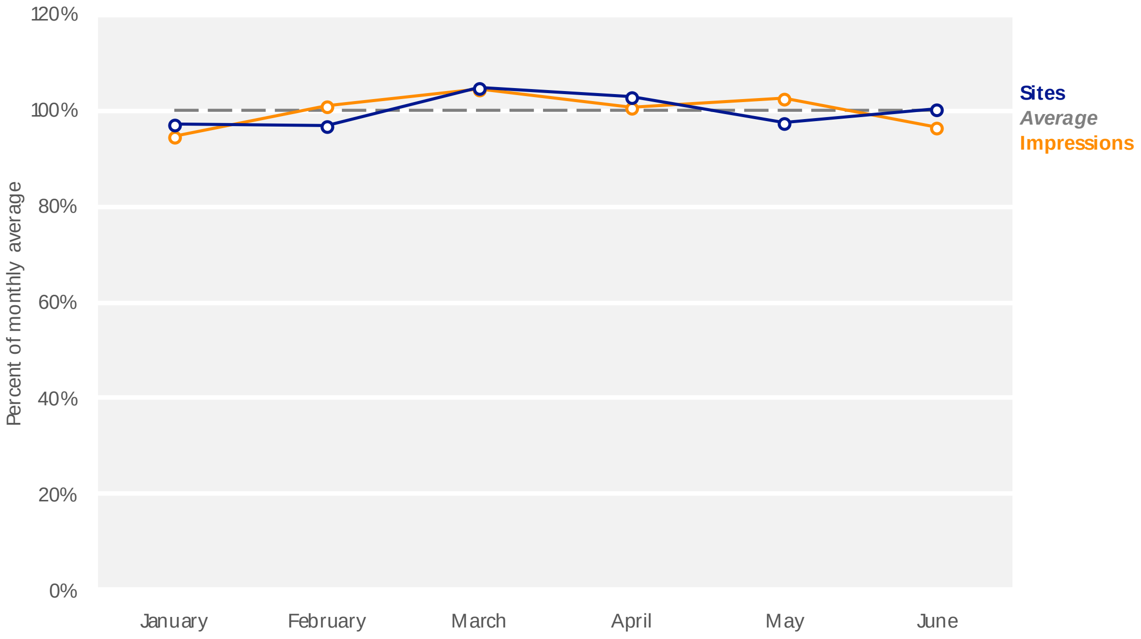
- In general, computers running newer versions of Windows tended to report being unprotected less often than computers running older versions.
- The high rate of protection with Windows 10 is primarily because of a change in the way Windows Defender operates. To provide Windows 10 users with protection from malware out of the box, Windows Defender is automatically activated upon installation of Windows 10 if no other real-time security product is installed, as opposed to a few days after installation in Windows 8 and Windows 8.1.

Malicious websites

Phishing sites

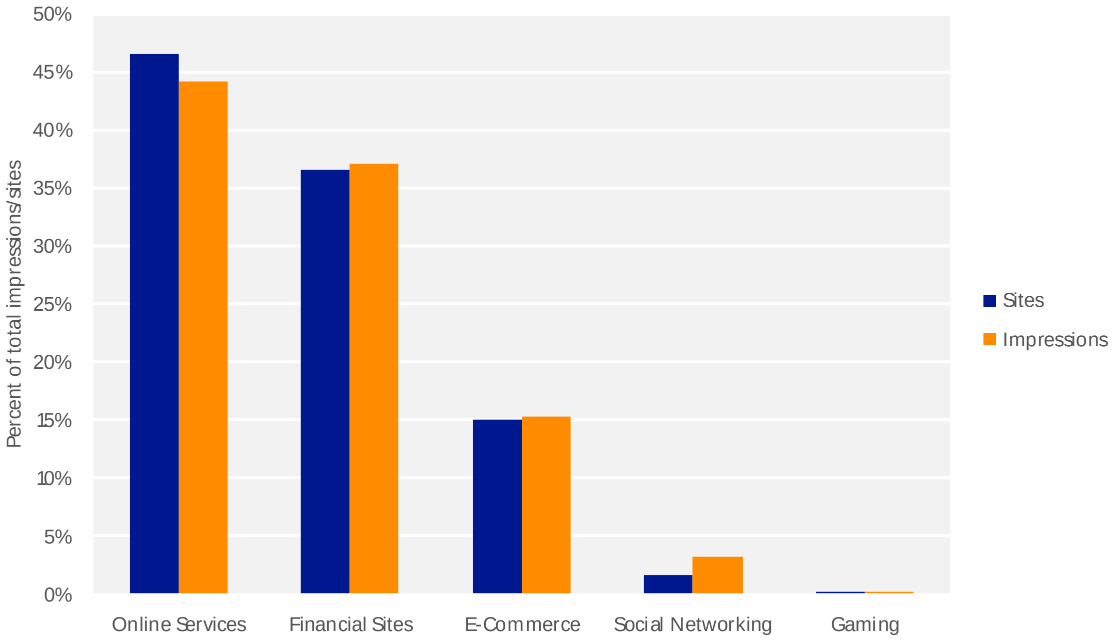
Microsoft gathers information about phishing sites and impressions from *phishing impressions* tracked by SmartScreen Filter in Microsoft Edge and Internet Explorer. A phishing impression is a single instance of a user attempting to visit a known phishing site with SmartScreen Filter enabled and being warned.

Figure 11. Phishing sites and impressions reported by SmartScreen Filter each month in 1H16, relative to the monthly average for each



Phishing sites that targeted online services received the largest share of impressions during the period, and accounted for the largest number of active phishing URLs.

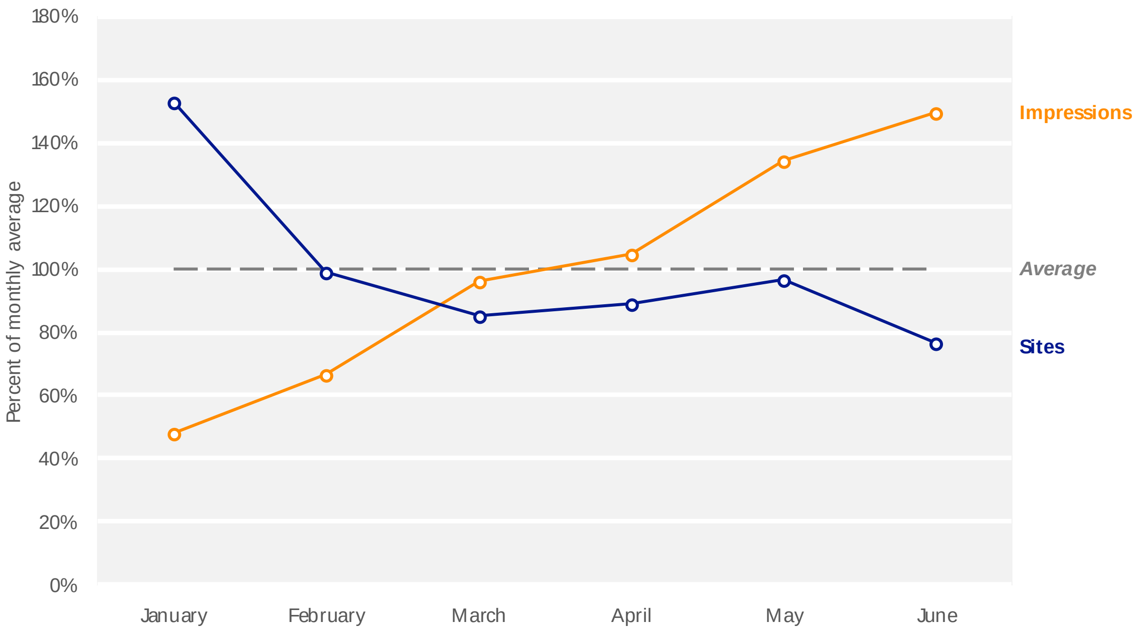
Figure 12. Phishing sites and impressions reported by SmartScreen Filter for each type of phishing site in 1H16



Malware hosting sites

SmartScreen Filter also helps provide protection against sites that are known to host malware. Figure 13 compares the volume of active malware hosting sites in the Microsoft database each month with the volume of malware impressions tracked.

Figure 13. Malware hosting sites and impressions tracked each month in 1H16, relative to the monthly average for each

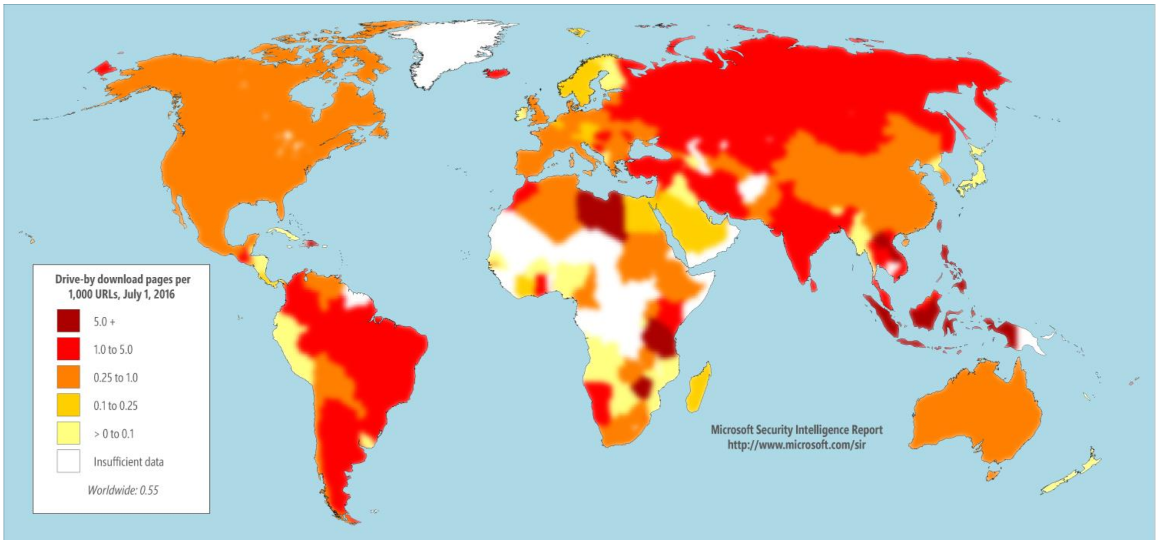


Monthly malware impressions more than tripled from January to June due to several factors, including aggressive campaigns by attackers and improved detection and classification by SmartScreen Filter. In 2015, the MMPC updated its malware evaluation criteria to include ads that are deceptive and misleading, which are now classified as malware by SmartScreen Filter and blocked. Over the past year, the volume of ads that meet these criteria has increased, including an emerging subset designed to take advantage of users seeking technical support.

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 14 shows the concentration of drive-by download pages in countries and regions throughout the world at the end of 2Q16.

Figure 14. Drive-by download pages indexed by Bing at the end of 2Q16 per 1,000 URLs in each country/region


Drive-by download pages per 1,000 URLs, July 1, 2016
5.0 +
1.0 to 5.0
0.25 to 1.0
0.1 to 0.25
> 0 to 0.1
Insufficient data
Worldwide: 0.55
Microsoft Security Intelligence Report
http://www.microsoft.com/sir

Significant locations with high concentrations of drive-by download URLs in both quarters include Taiwan, with 7.4 drive-by URLs for every 1,000 URLs tracked by Bing at the end of 2Q16; Mongolia, with 3.1; and Iran, with 2.6.

This document summarizes the key findings of the report. Visit www.microsoft.com/sir to download the full version, which includes in-depth analysis of the findings summarized here. It also includes security data and analysis for more than 100 individual countries and regions, along with featured intelligence reports on a number of important security topics.