TECHNICALBRIEF

BEDEP

Introduction

Zero-day vulnerability exploit incidents topped the security headlines in late January to early February 2015. The vulnerabilities involved some versions of Adobe® Flash® Player and were discovered to be two different ones. The first incident was designated as CVE- 2015-0311 and the second incident as CVE-2015-0313.[1-4] The first zero-day incident was discovered by security researcher Kafeine and involved malvertisements posted on legitimate sites being used to deliver the exploit to vulnerable systems.[5]

Our analysis showed that the Angler exploit kit was used here. The second zero-day, discovered by Trend Micro, also displayed the same delivery of the threat and exploitation method, with the dailymotion.com, a legitimate site, identified as the hosting site. Certain similarities in the obfuscation method of the exploit delivery initially showed that the Angler. Further analysis, including a feedback from Kafeine, proved that the Hanjuan exploit kit was used in this instance. The obfuscation method in this case involves the function used to load and execute the exploit loadbyte(). The function itself is obfuscated through string operations. In both attacks, this method is used in near-identical fashion to load the malicious Flash file with the exploit code detected as SWF_ANGZIA.A for the first attack, and SWF_EXPLOIT.MSJT for the second.[6-7]

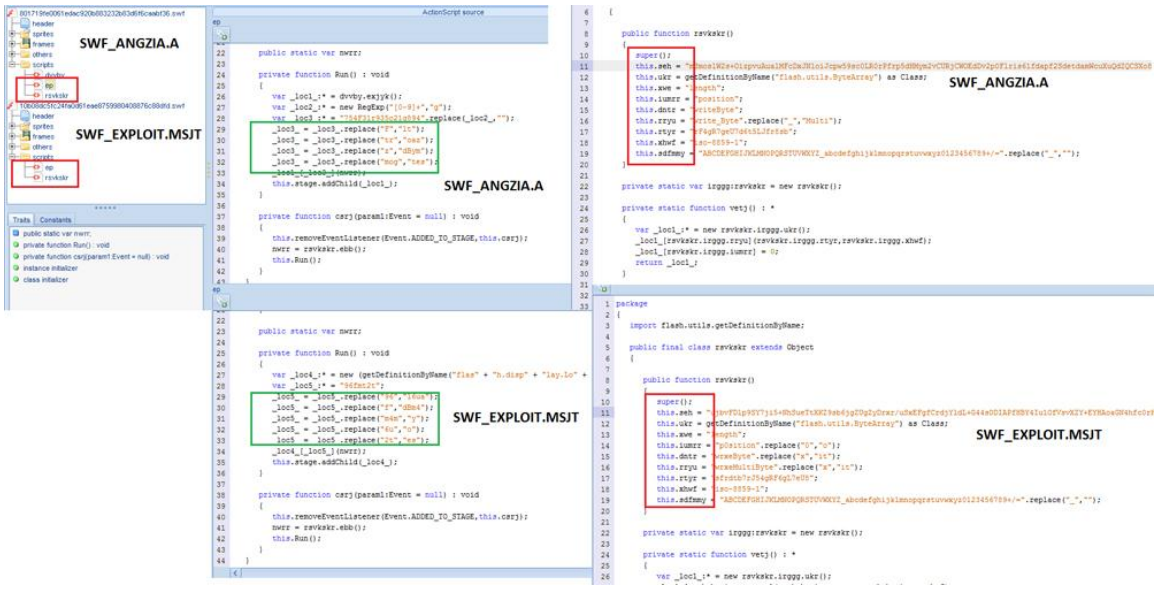


Figure 1. Similar obfuscation methods between two recent zero-days

Another similarity is the malware used as a payload. The payload in both attacks have been identified as BEDEP, a malware family whose main purpose is advertising fraud, turning any system it infects into a member of its botnet.[8] This report provides an in-depth technical description of the malware BEDEP.

Threat Details

BEDEP was first spotted in September 14, 2014. Identified as backdoor malware, BEDEP's malicious routines include advertising fraud and downloading of other malicious files onto an affected system. From our analysis, we believe that its main purpose is to induct the system it infects into a botnet, most likely to perform other malicious activities (besides advertising fraud). Attackers can even command vulnerable Dynamic Host Configuration Protocol (DHCP) server to execute arbitrary code on client systems.

Arrival Routine and Concealment Method

BEDEP usually arrives into systems either as the final payload of a malvertisement attack (as described in the January 2014 zero-day Flash vulnerability incidents) or by being downloaded by a potentially unwanted application (PUA) installer.[9] PUAs are software that may not harbor malicious code but could expose a user to threats like information theft or other downloaded malware.

In the first method, a system is infected when its user unwittingly visits a site that hosts malvertisements. The malvertisement then leads the user to a landing page hosting the exploit, which in turn, downloads BEDEP strains onto vulnerable systems, specifically, BKDR64_BEDEP.E and TROJ64_BEDEP.E.[10] These downloaded BEDEP strains are then executed without user authorization. The exploit file is detected in the Angler attack as SWF_ANGZIA.A and SWF_EXPLOIT.MJST.

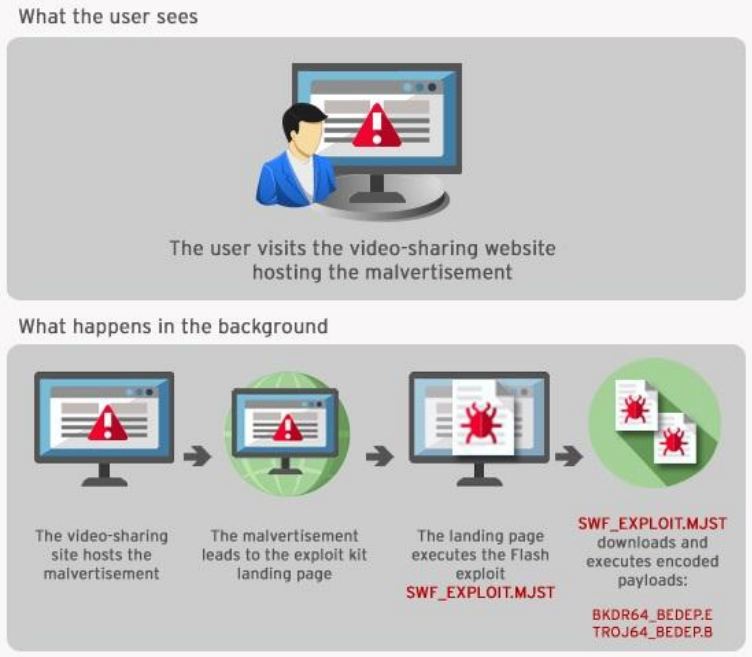
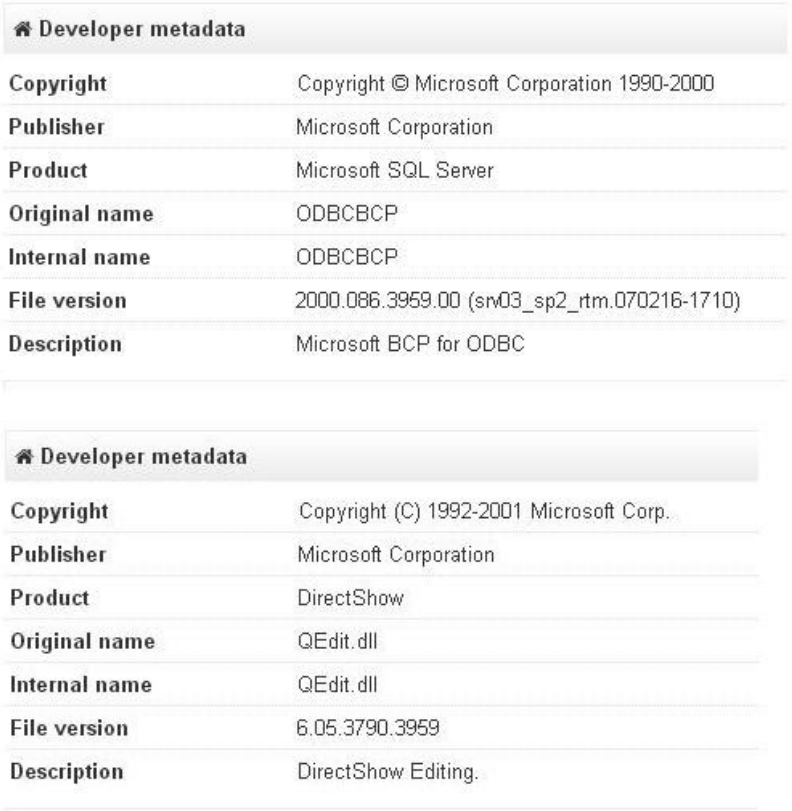


Figure 2. How BEDEP arrives

As for the second method, it is downloaded along with other component files by PUA/grayware that is voluntarily downloaded and installed by the user. The downloaded component file is discovered to be of the .DLL variety and bore the file name *rifa.dll*.



Developer metadata	
Copyright	Copyright © Microsoft Corporation 1990-2000
Publisher	Microsoft Corporation
Product	Microsoft SQL Server
Original name	ODBCBCP
Internal name	ODBCBCP
File version	2000.086.3959.00 (srv03_sp2_rtm.070216-1710)
Description	Microsoft BCP for ODBC

Developer metadata	
Copyright	Copyright (C) 1992-2001 Microsoft Corp.
Publisher	Microsoft Corporation
Product	DirectShow
Original name	QEdit.dll
Internal name	QEdit.dll
File version	6.05.3790.3959
Description	DirectShow Editing.

Figure 3. BEDEP's fake Microsoft file properties

BEDEP and its strains are known to skirt detection because of its heavy encryption. It also comes as a file with manipulated Microsoft file properties to make it appear legitimate upon inspection.

Routines

BEDEP strains feature the following malicious routines:

- Injects malicious code into normal processes (explorer. exe and iexplore.exe).
- Downloads and executes arbitrary code
- Connects to malicious URLs/remote malicious users
- Post stolen system information (build ID, bot ID, processor and OS version) to its C&C servers
- Update itself

BEDEP also has the ability to distinguish the processor of the system it is infecting, installing either 32-bit or 64-bit variant, whichever is suitable. This bypasses the security measures of 64-bit versions and ensures that the execution of the malicious routines takes place.

Impact

From November 2014 to February 2015, we kept track of BEDEP's infection count worldwide, taking into account all BEDEP strains currently in the wild, including their 32-bit and 64-bit variants. What we discovered:

- The U.S. is region with the highest number of infections during the four-month tracking period
- Japan is the next hardest hit, with over 21% of the total infection count
- The spike in infection count takes place in January and extends to February, accounting for more than half of total infections.

Figure 4. Total BEDEP infection count from November 2014 to February 2015

The peak in BEDEP's infection count in January can be attributed to the Adobe Flash zero-day vulnerability events, as well as the usage of the Angler exploit kit that takes advantage of the vulnerability itself. We can also look at this as proof of the effectiveness of the infection method used: malvertisements hosted on popular video-hosting websites. Delivering exploits through malvertisements is not a new tactic, but being able to lead users to a malicious URL without any interaction from the users' part makes this technique a serious threat.

Solutions and Recommendations

Properly configured endpoint solutions can ensure the prevention of BEDEP coming into the machine or network it's connected to. Components of OfficeScan™ Endpoint Protection, such as SmartScan, Web Reputation Service, Behavior Monitoring, and Smart Feedback offer the best protection against BEDEP by detecting malicious files.[11]

Worry-Free™ Business Security/Services (WFBS/ WFBS-SVC) is also equipped with technologies that detect and remove BEDEP in infected machines and networks.[12]

Some best practices that can be adopted to prevent BEDEP infection:

- **Think before you click.** Reckless browsing behavior often leads to a compromised online experience.
- **Update and patch.** Updating software is usually a baseline best practice for enterprise and home users. However, if the situation allows, disabling the vulnerable software
- **Stay tuned.** Be in-the-know of the latest forms of infection used by cybercriminals. Read up on the latest in online security. This would give you a firm grasp on what to do to stay away from becoming a victim.

Trend Micro customers are protected from BEDEP and the elements that lead to its infection.

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