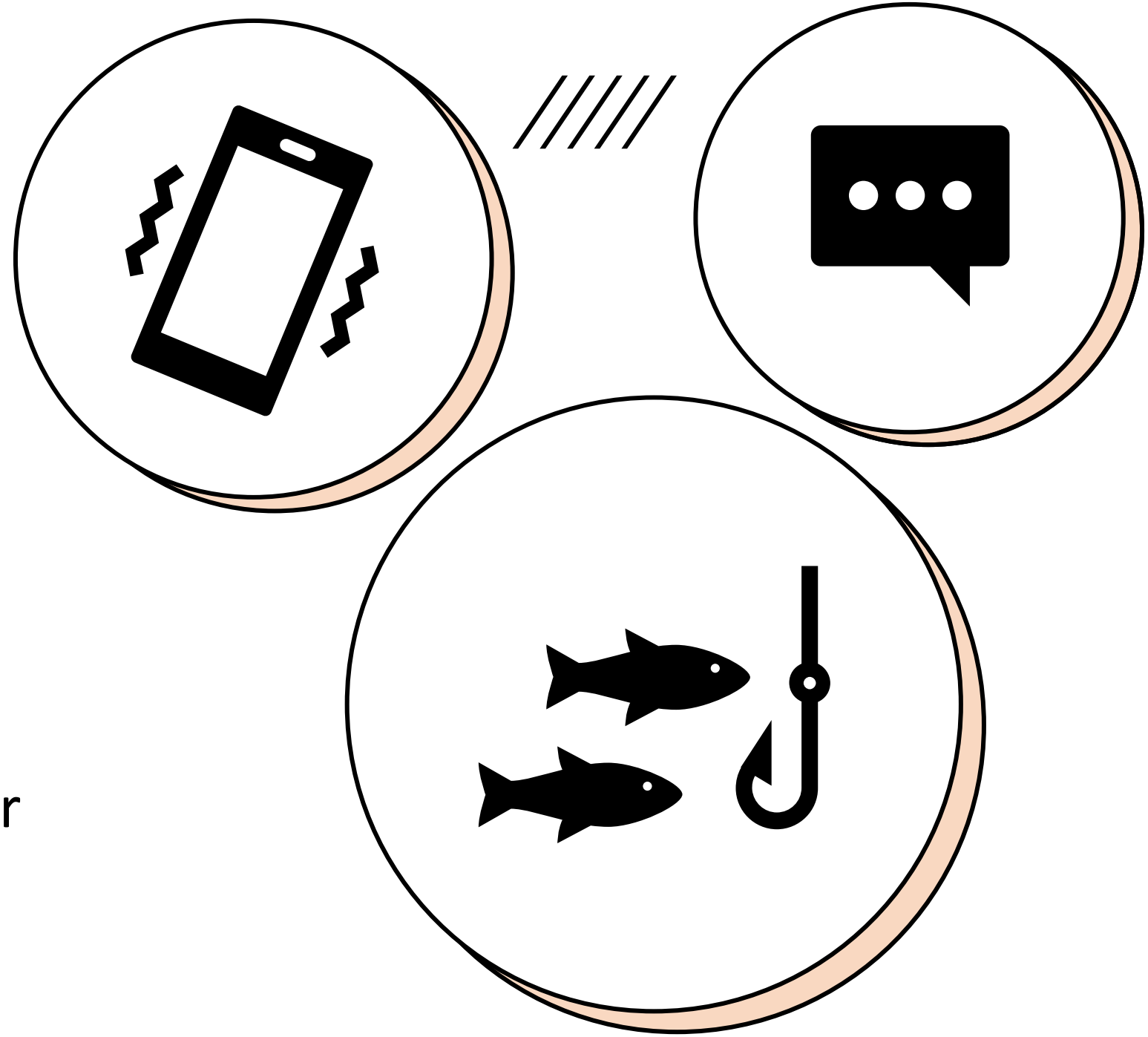
# They Can’t Keep Getting Away With It

Analysis of 0ktapus/ScatteredSpider campaigns



# C:\User\wthomas

Cyber Threat Intelligence Researcher (4 years)

Equinix – the world's digital infrastructure company

Equinix Threat Analysis Center (ETAC)

Co-author of the SANS FOR589 Cybercrime Intelligence course

Co-founder of the Curated Intelligence trust group

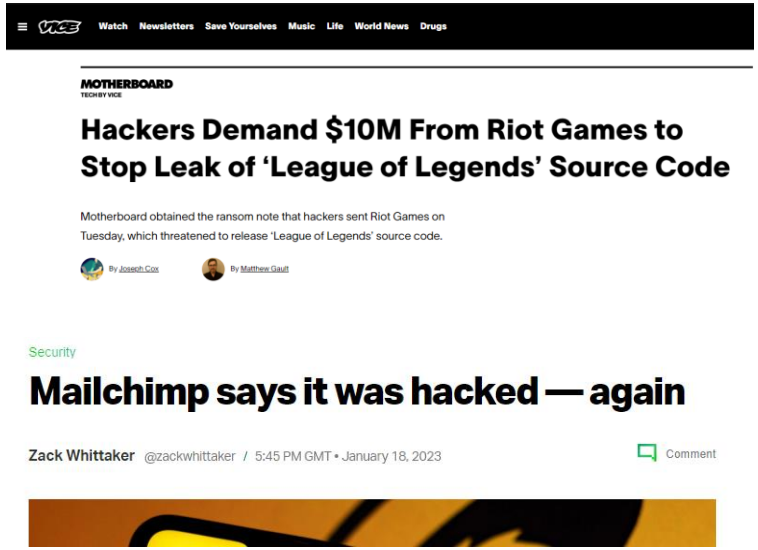

- https://blog.bushidotoken.net/
- https://twitter.com/BushidoToken
- https://github.com/BushidoUK
- https://www.sans.org/profiles/will-thomas/
- https://www.linkedin.com/in/william-t/

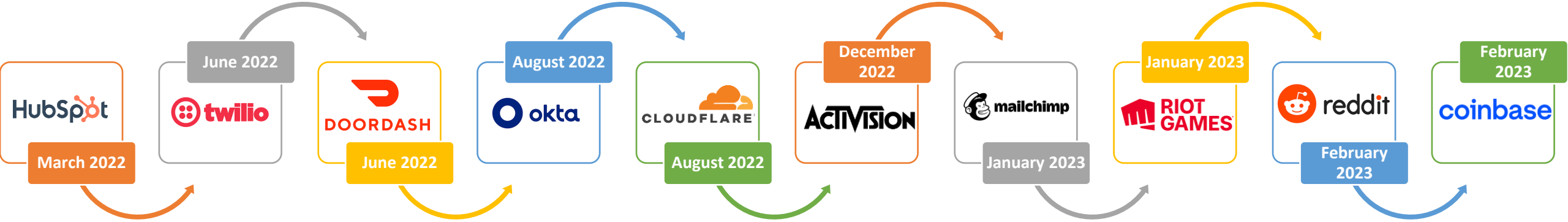
# A Bunch of Big Breaches


Featured Article

## DoorDash hit by data breach linked to Twilio hackers

Hackers accessed DoorDash customer information and some partial payment data


## Information About HubSpot's March 18, 2022 Security Incident

{okta}

August 25, 2022

## Detecting Scatter Swine: Insights into a Relentless Phishing Campaign

Defensive Cyber Operations

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## The mechanics of a sophisticated phishing scam and how we stopped it

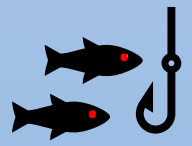
09/08/2022


Who?
What?
Why?
Where?
When?
How?
English-speaking cybercriminals
Successfully hacking the Fortune 500
Financially motivated
Mainly target North America
Active since early 2022 – Present
Launch persistent social engineering campaigns
They can trivially defeat enterprise-level security systems

# How do they do it?

**The target receives an SMS text message with a malicious link**

**The user visits the malicious link and enters their credentials**



**The attackers enter the provided credentials and ask the user for the 2FA prompt**

**The user provides the 2FA prompt to the attacker and the attacker gains access**

**The attackers may also make a phone call and pose as the company IT team**

**Once inside, the attackers gain persistence, move laterally, and escalate privileges**

**Sensitive enterprise data or product source code is then stolen from the organization**

**The target organization is then likely to be extorted and the customer data is exploited**

(Example on the next slide)

Activison Automated SMS Dispatcher:
To: [redacted]
Employment Status: UNDER REVIEW
https://activision.[redacted]/employee/updateinfo/20032/

L

5:39 PM

Activison Automated SMS Dispatcher:
To: [redacted]
Note: Please respond with the 2fa code sent

L

5:45 PM

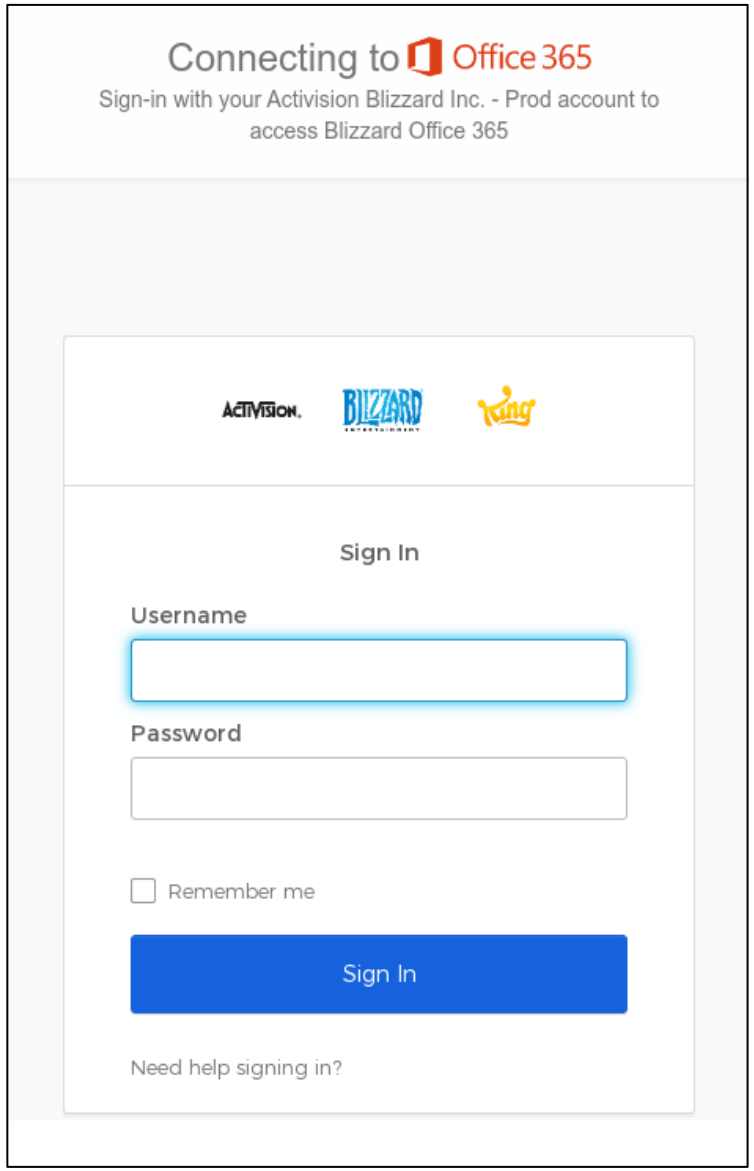
816740

([redacted] • 5:45 PM

Activison Automated SMS Dispatcher:
To: [redacted]
Note: Issue Resolved

L

5:46 PM




*"We have obtained your valuable data... your precious anti-cheat source code and the entire game code for League of Legends and its tools"*

*"...a small request for an exchange of $10,000,000"*

*"We do not wish to harm your reputation or cause public disturbance. Our sole motivation is financial gain."*

*"We will also provide insight into how the breach occurred and offer advice on preventing future breaches"*

*"It is alarming to know that you can be hacked within a matter of hours by an amateur-level hack"*

Dear Riot Games,

We have obtained your valuable data, including the precious anti-cheat source code and the entire game code for League of Legends and its tools, as well as Packman, your usermode anti-cheat. We understand the significance of these artifacts and the impact their release to the public would have on your major titles, Valorant and League of Legends. In light of this, we are making a small request for an exchange of $10,000,000.

We uploaded a tree list pdf file, which you can view the tree of Packman and League of Legends source. If you require any files for proof, message us and we will provide you the raw file.

In return, we will immediately remove all source code from our servers and guarantee that the files will never be released to the public. We will also provide insight into how the breach occurred and offer advice on preventing future breaches. We suggest communicating through Telegram, you can join us here:

[Telegram link]

We do not wish to harm your reputation or cause public disturbance. Our sole motivation is financial gain.

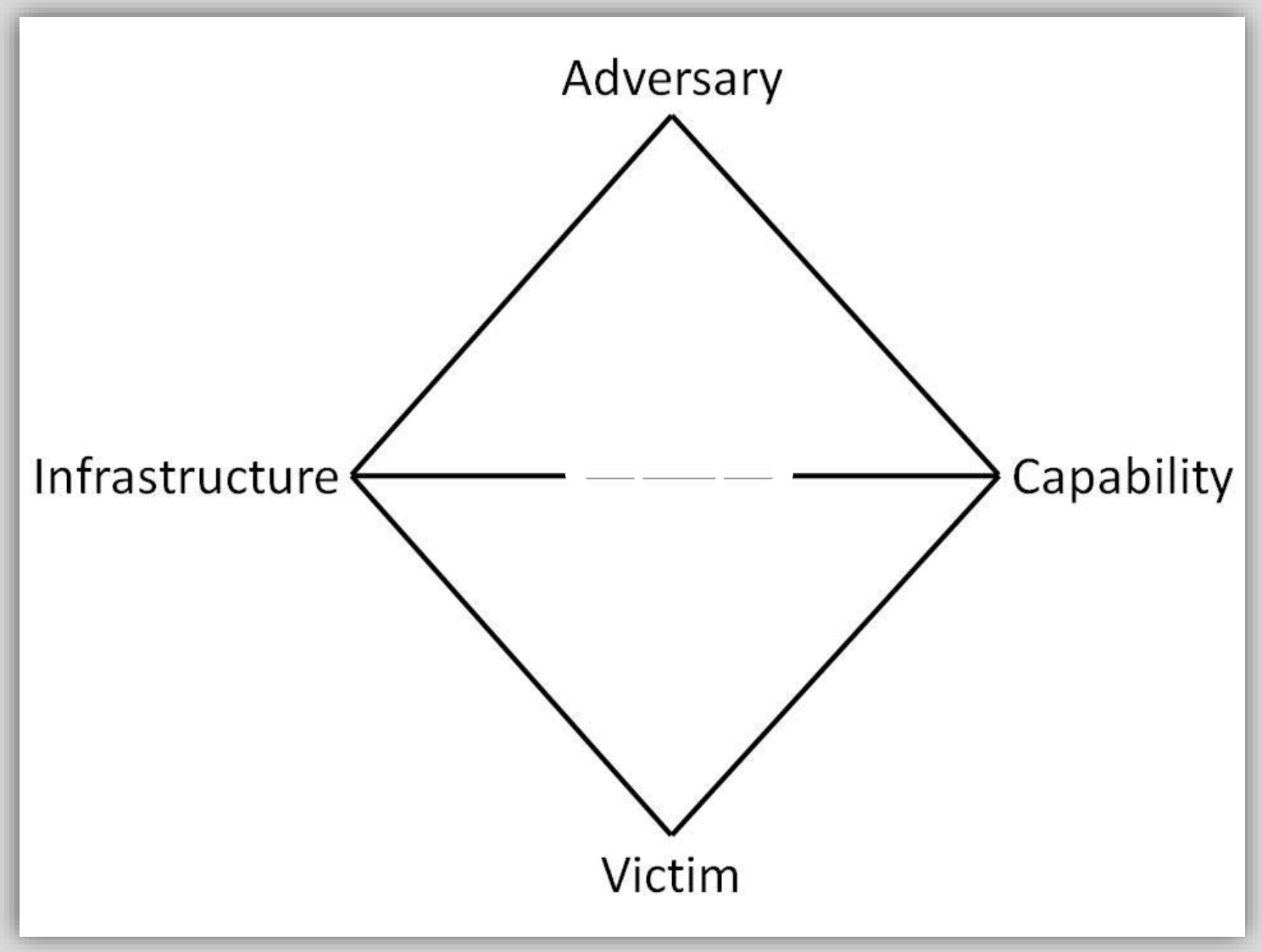
We have sent this message to the Directors only and have given you twelve hours to respond. Failure to do so will result in the hack being made public and the extent of the breach being known to more individuals.

We also want to remind you that it would be a shame to see your company publicly exposed, especially when you take great pride in your security measures. It is alarming to know that you can be hacked within a matter of hours by an amateur-level hack.

We urge you to take this matter seriously and consider our proposal.

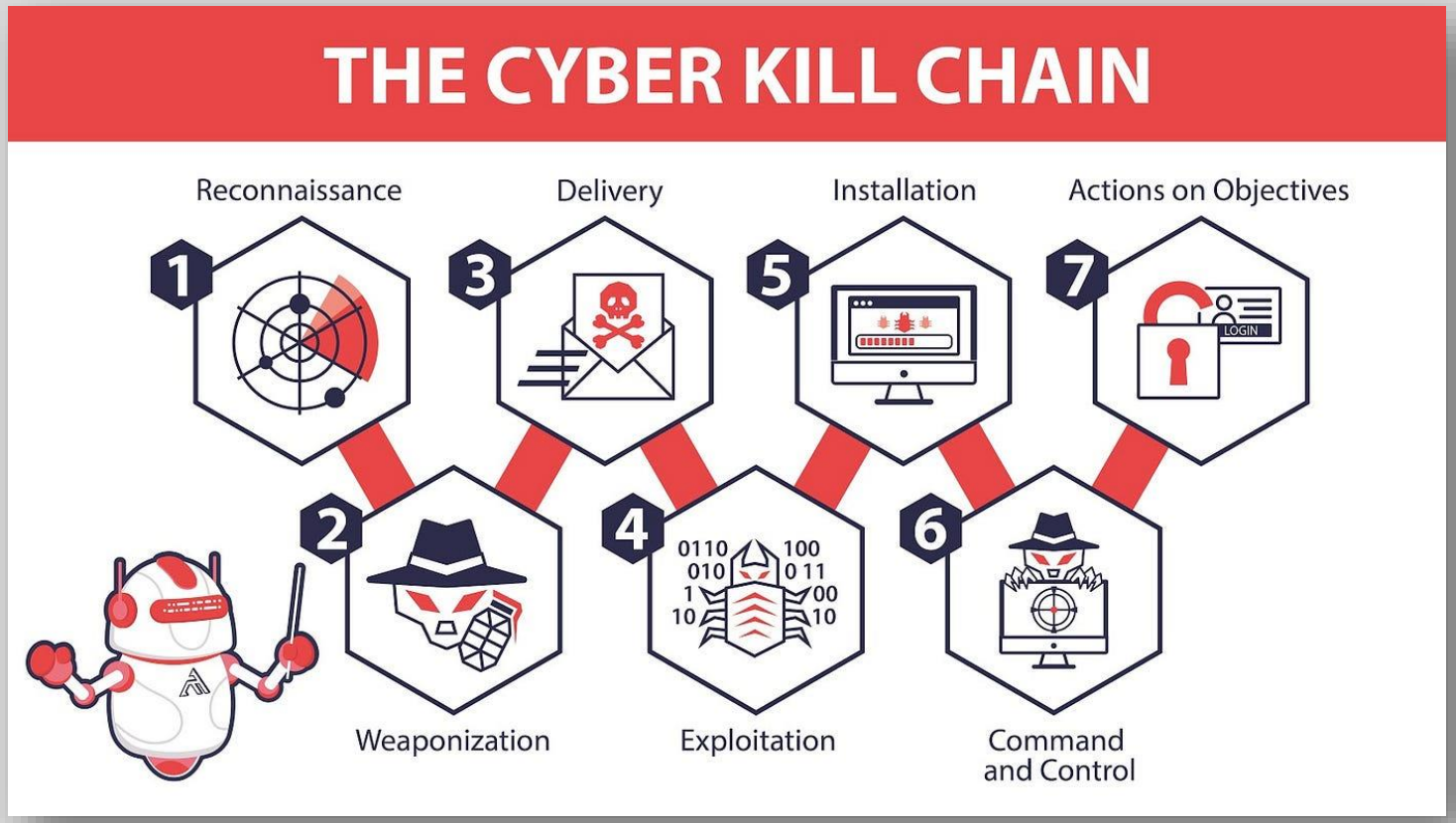
# The Diamond Model

## A Threat Analysis Framework



# The Lockheed Martin Cyber Kill Chain®

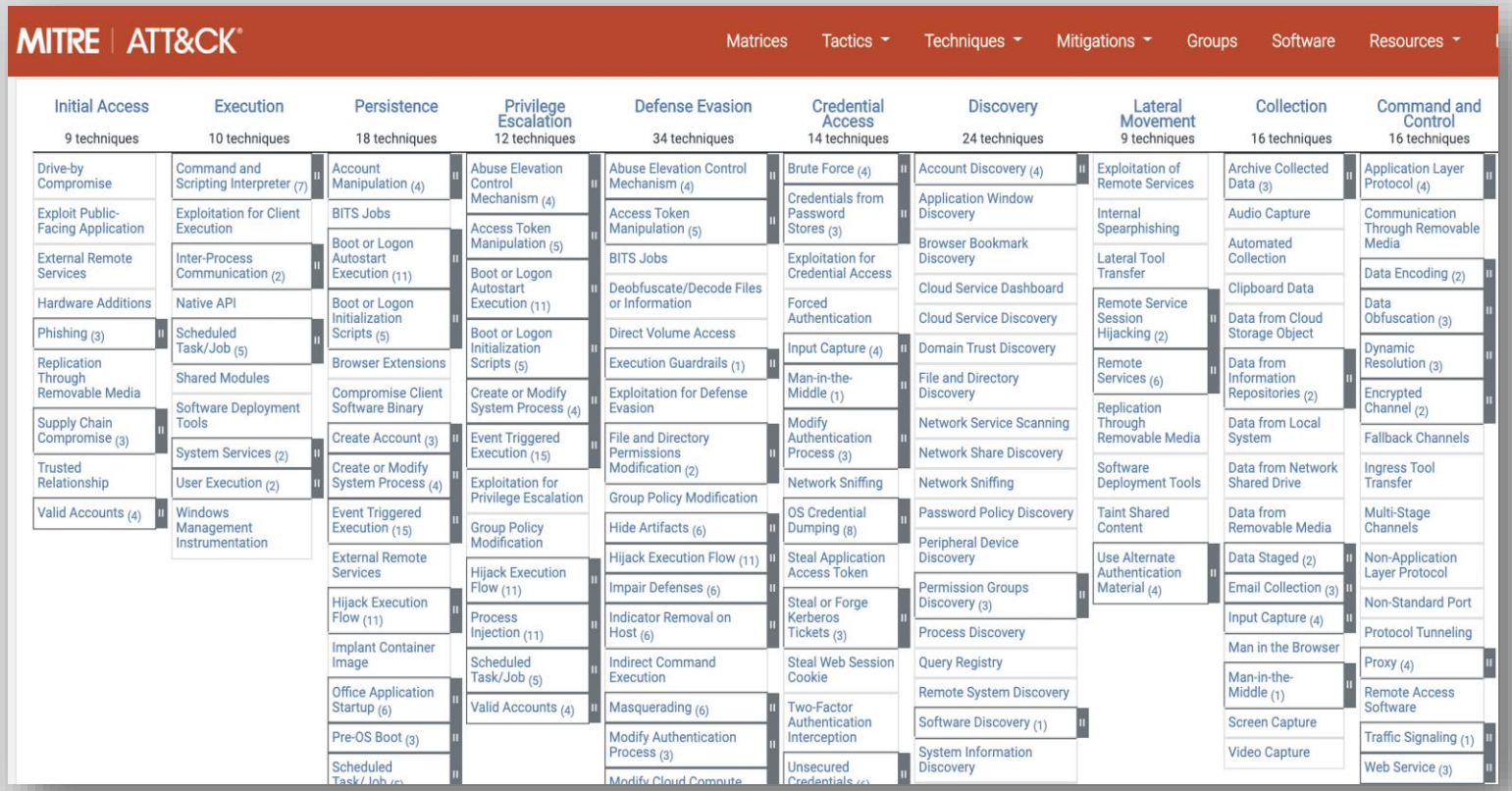
An Intrusion Analysis Framework



# The MITRE ATT&CK® framework

## Adversary Tactics, Techniques & Common Knowledge

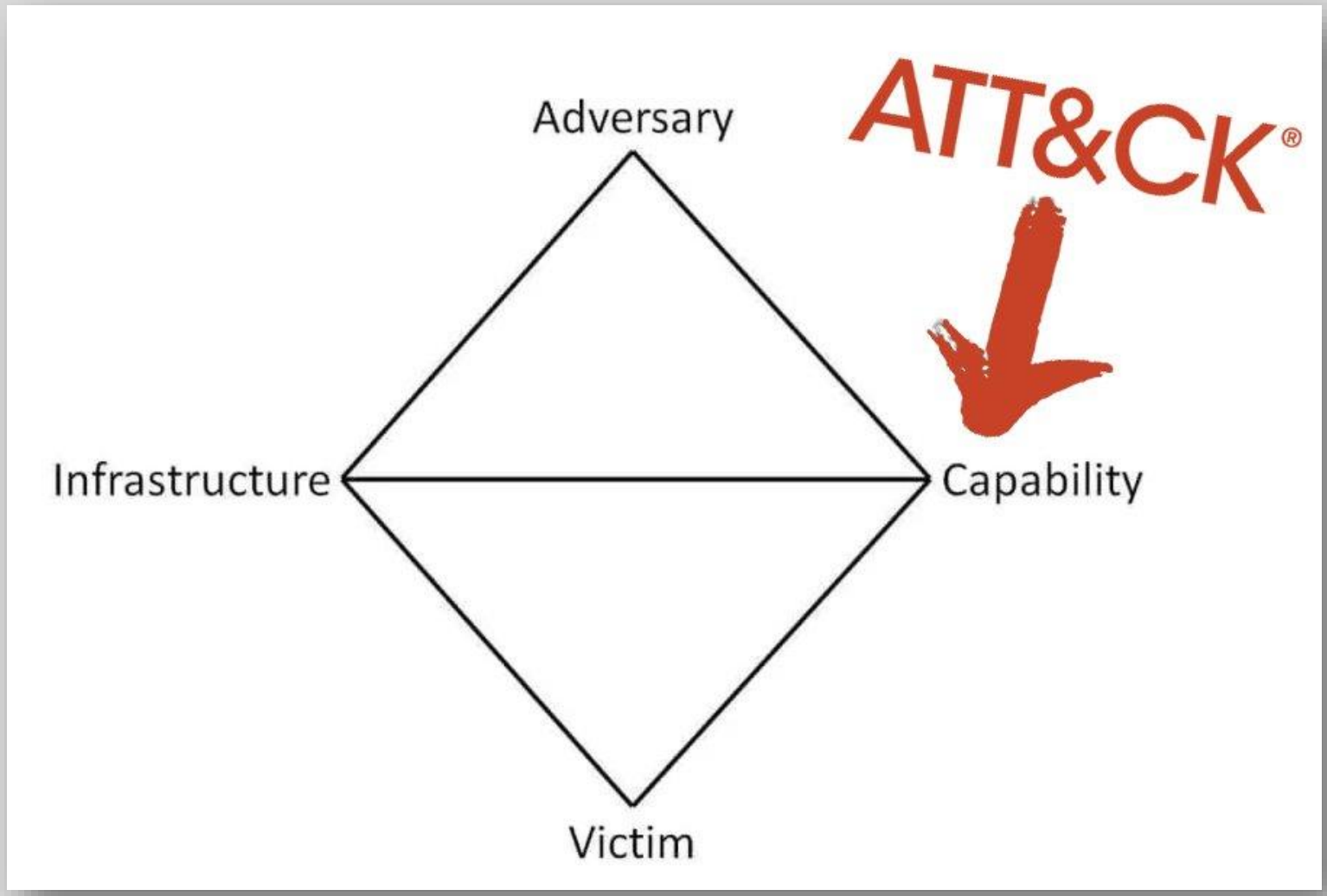
## A Capability Analysis Framework



# 0ktapus/ ScatteredSpider Capabilities

- Preparation
- Social Engineering
- Evading Security
- Cloud Exploits
- Exfiltrating Data

## MITRE ATT&CK



# Capabilities: Preparation

Research the target's Single Sign-On (SSO) provider

- https://duo.com/solutions/customer-stories
- https://www.okta.com/customers/
- https://customers.twilio.com/

Using OSINT for "Customer success stories" reveal which organizations use which SSO services

Use Data Brokers for Targets of Interest

- Employer
- Name
- Phone Number
- Email Addresses
- Passwords

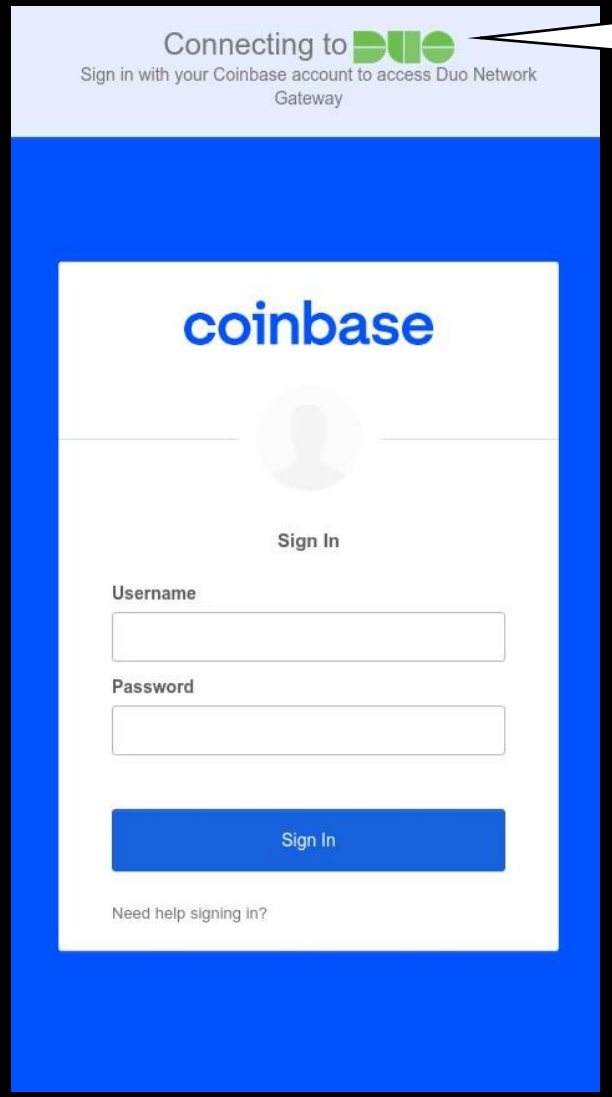
zoominfo

DEHASHED™

RocketReach

# Capabilities: Social Engineering

- SMS phishing
  - "Schedule changed"
  - "Employment Terminated"
- Voice Calls
  - Threatening Individuals
  - Bribing Individuals
- SIM Swapping
  - Hijacking phone numbers




The adversary knew which SSO provider Coinbase used

*"The attacker claimed to be from Coinbase corporate Information Technology (IT) and they needed the employee's help"*
*– Coinbase (Feb. 2023)*

# What is SIM swapping?

SIM swapping involves tricking employees of a mobile provider into transferring someone else's number to a SIM card controlled by a threat actor

They can accomplish that by social engineering. Also, fraudsters have bribed or otherwise compromised telecommunications employees to help them

With control of a number, fraudsters can intercept one-time passcodes (OTPs) used to log into online accounts.

Successful SIM swaps have resulted in raided cryptocurrency accounts and staggering losses

Possession of a phone number can be enough to reset passwords for other online accounts as well

The victim is compromised because the mobile provider failed to securely vet the number transfer

# Evading Enterprise Security

**Remote Monitoring and Management (RMM) tools**

- AnyDesk, TeamViewer… and 20 others

**Session Hijacking**

- EditThisCookie browser extension

**Bring-Your-Own-Vulnerable-Driver (BYOVD)**

- Intel Ethernet diagnostics driver

**Code-signing Certificates**

- NVIDIA stolen certificate

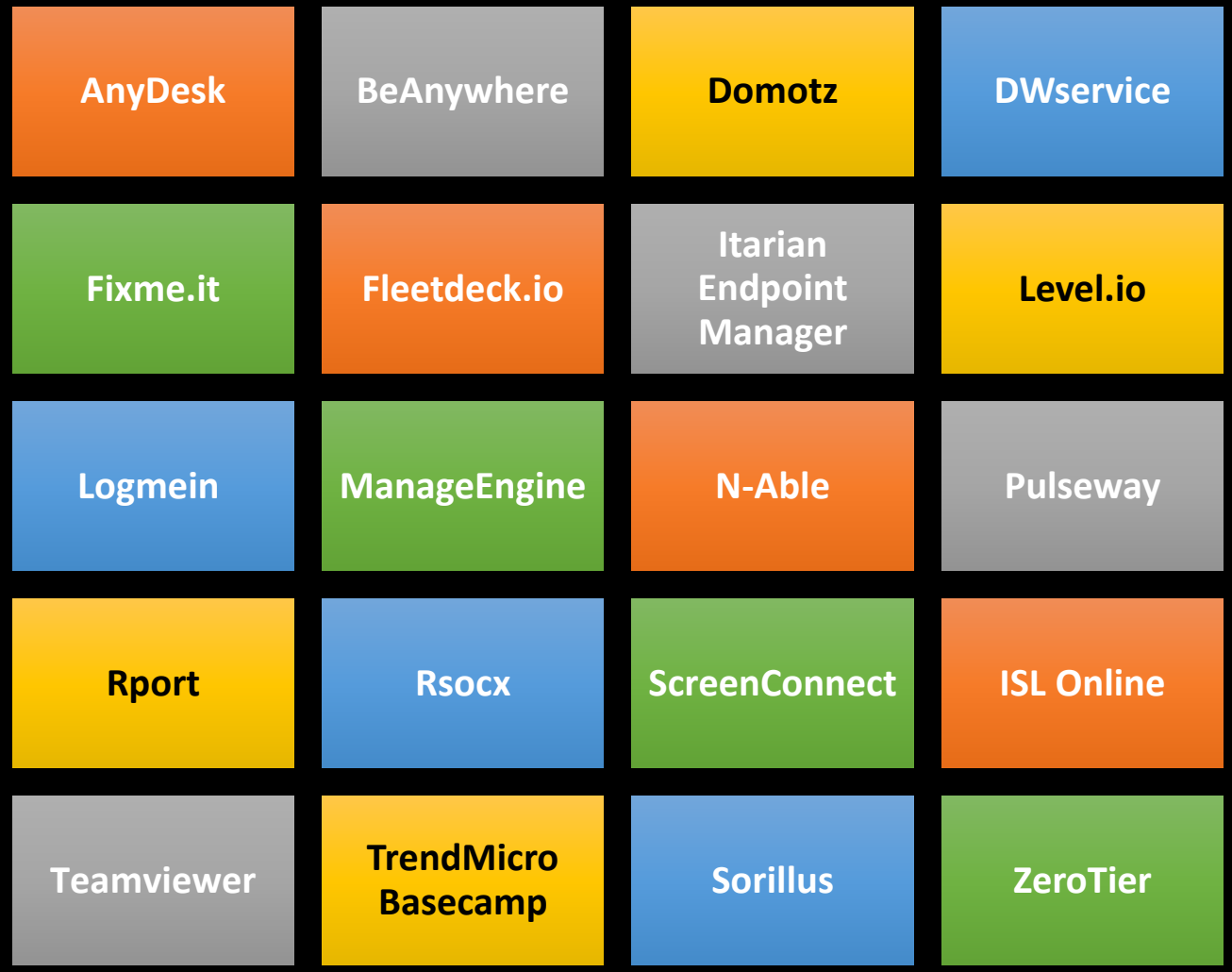
**UEFI bootkit**

- BlackLotus

**Tunneling tools**

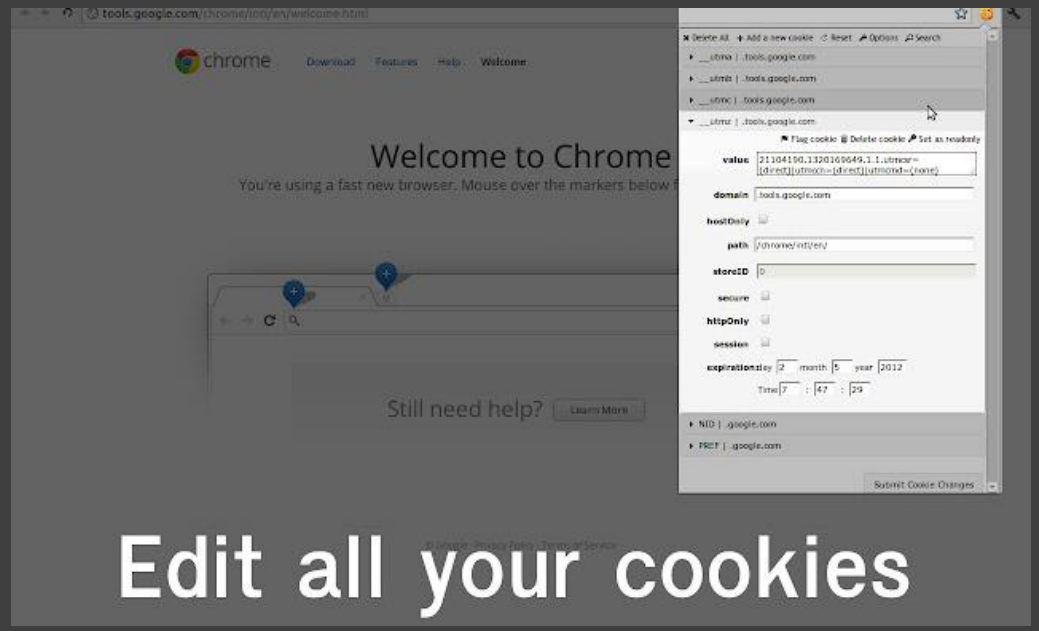
- Rsocx, Ngrok, Plink

# Remote Monitoring and Management (RMM) Tools




(Up to 20 different RMM tools!)

# EditThisCookie


- Intended for Website Testing
- Used for stealing Web Session Cookies
- Enables Browser Session Hijacking attacks
- Provides access to Web Apps and SaaS platforms
- Bypasses Multi-factor Authentication (MFA) protocols
- Can pivot into an Authenticated Intranet

# Bring-Your-Own-Vulnerable-Driver (BYOVD)

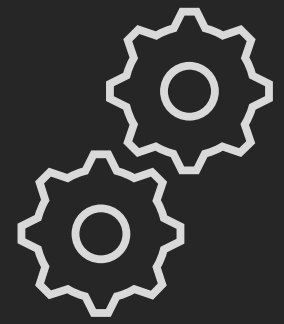
Windows does not allow unsigned kernel-mode drivers to run by default.

BYOVD makes it possible bypass Windows kernel protections

The adversary deployed an Intel Diagnostics Driver vulnerable to CVE-2015-2291

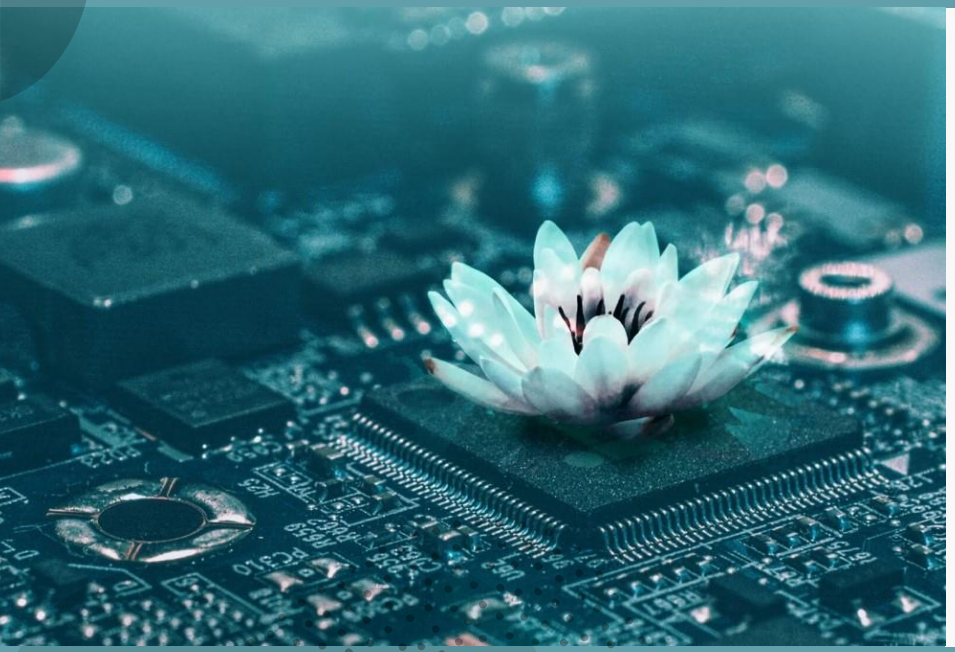
CrowdStrike saw it bypass MS Defender, Palo Alto Networks Cortex XDR, and SentinelOne EDR

By disabling the endpoint security the actor can further their actions on objectives



# BlackLotus Unified Extensible Firmware Interface (UEFI) Bootkit

BlackLotus was first advertised on a cybercriminal underground forum in October 2022 for $5,000



maxwell187
kilobyte

Paid registration
3
35 posts
Joined
08/29/22 (ID: 135469)
Activity

Posted October 6 Report post

Dear members,

BlackLotus is a new UEFI Bootkit for Windows with integrated Secure Boot bypass and Ring0/Kernel protection against removal. The purpose of this software is to act as a HTTP Loader.
Due to the strong persistence there is no need to regularly update the Agent with new crypts. Once installed, AVs will be unable to scan and remove it.

The software consists of two main components: Agent (installed on the target device) and Web Interface (used by administrators to control bots). Bot = Device with Agent installed.

# BlackLotus Features

It can run on Windows 10 and 11 systems with UEFI Secure Boot enabled

It is the first malware to exploit CVE-2022-21894 to bypass UEFI Secure Boot in Windows

It can be used to disable BitLocker, hypervisor-protected code integrity (HVCI), and Windows Defender

Some BlackLotus installers do not proceed if the host uses is in Armenia, Belarus, Kazakhstan, Moldova, Russia, or Ukraine

An common unwritten rule for malware developers from Russian or the Commonwealth of Independent States (CIS)

# Also… they attack Cloud and Virtualized Infra

## Azure

- Used compromised credentials to access Azure Tenants
- Launched **Azure VMs** for lateral movement to on-premises systems
- Exported the configuration of Azure AD tenants and its users

## AWS

- Compromised **ForgeRock OpenAM** servers to assume **AWS Instance Roles**
- Used **aws_consoler** to create accounts for non-existent users issued by identity and access management (IAM) users
- Pivot from the **AWS CLI** to console sessions without the need for MFA

## VMware ESXi

- Installed the **rsocx reverse proxy tool** and **Level.io** RMM tool on an ESXi hypervisor appliance
- Launched the **RustScan** port scanner from a Docker container running on an ESXi appliance


# Oktapus/ ScatteredSpider

A blueprint of their attacks

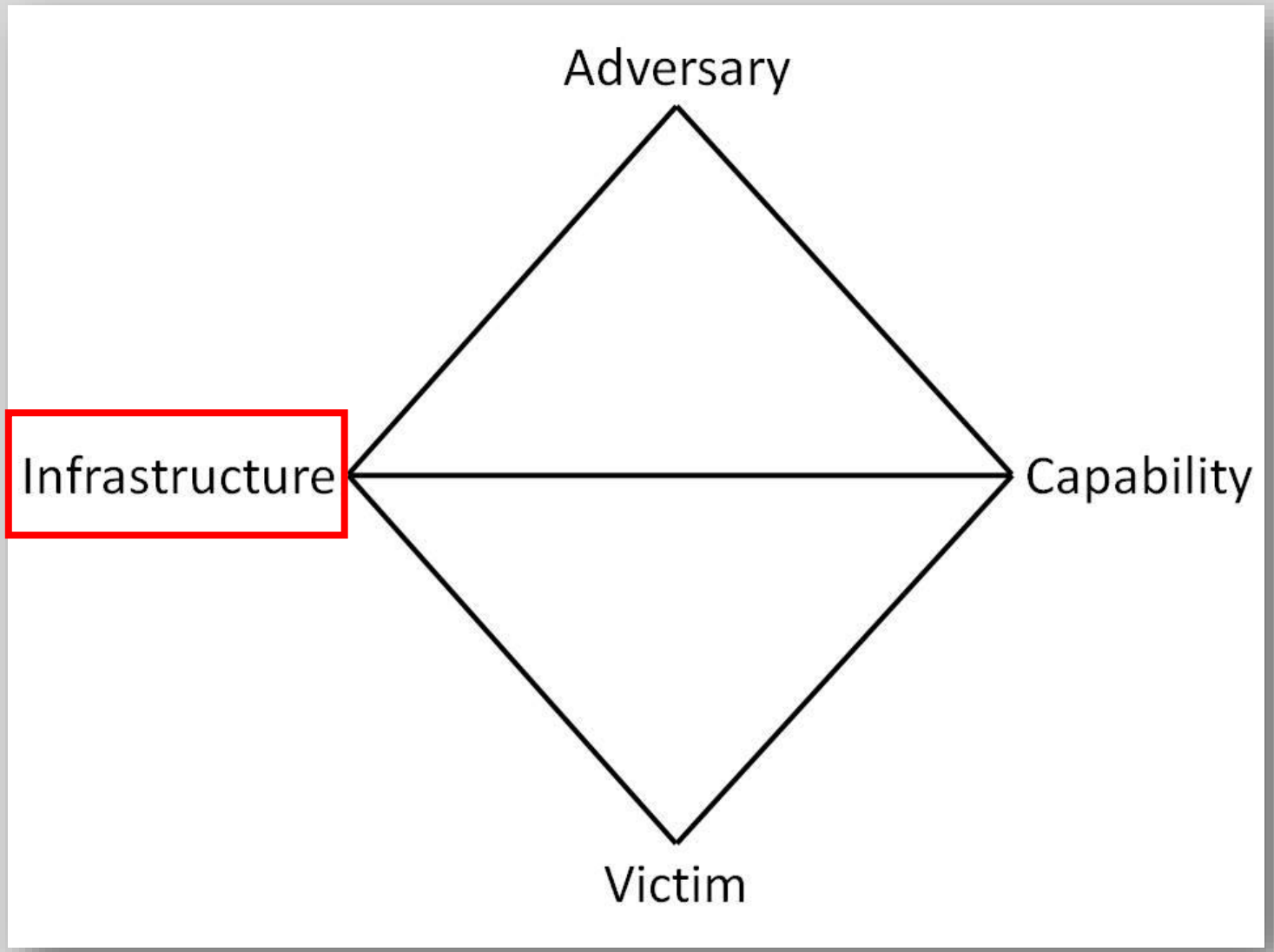
## MITRE ATT&CK TTPs

| Tactic | Technique | Procedure |
|---|---|---|
| Reconnaissance | Gather Victim Org Information | Identify SSO provider, Clone Login Page |
| | Gather Victim Identity Information | Phone Numbers, Employment |
| Resource Development | Acquire Infrastructure | Register Domains and Host phishing pages |
| Initial Access | Phishing | SMS texts with malicious links |
| | Vishing | Calling victims and social engineering them |
| Execution | User Execution | Clicking malicious links, providing credentials |
| Persistence | Valid Accounts | Credentials provided by user via phishing |
| | Browser Extensions | Install Cookie stealing browser extension |
| Credential Access | Steal Web Session Cookie | Using the browser extension |
| Defense Evasion | Code-signing | Delivers tools signed with valid certificates |
| | Rootkit | Leverages a Windows Driver to terminate EDR |
| | Bootkit | Leverages BlackLotus UEFI Bootkit to disable tooling |
| Command and Control | Remote Access Software | Use a legitimate tool to control victim's system |
| | Proxy | Tunnelling tools and VPN to conceal connections |
| Exfiltration | Exfiltration via Cloud Service | File-sharing Cloud services to upload files to |

# Oktapus/ ScatteredSpider

Infrastructure

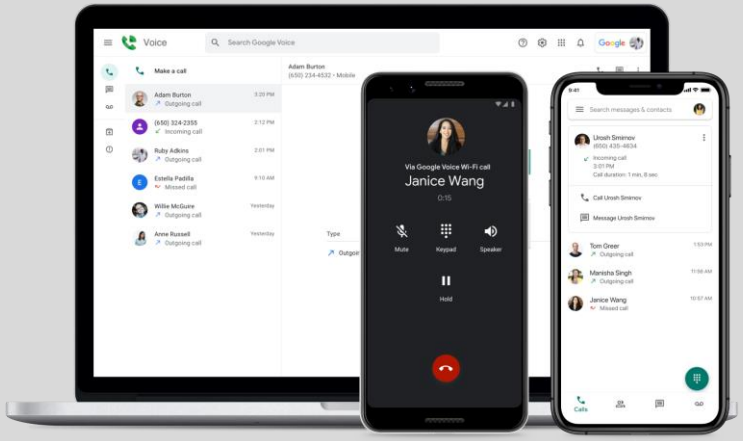
## Attack and Campaign Infrastructure

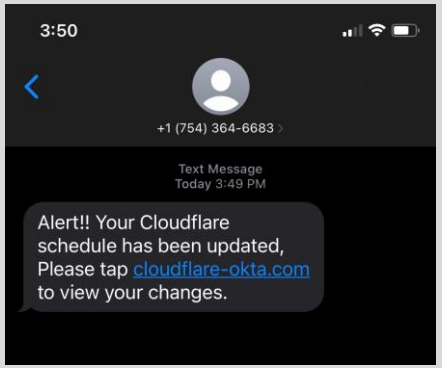


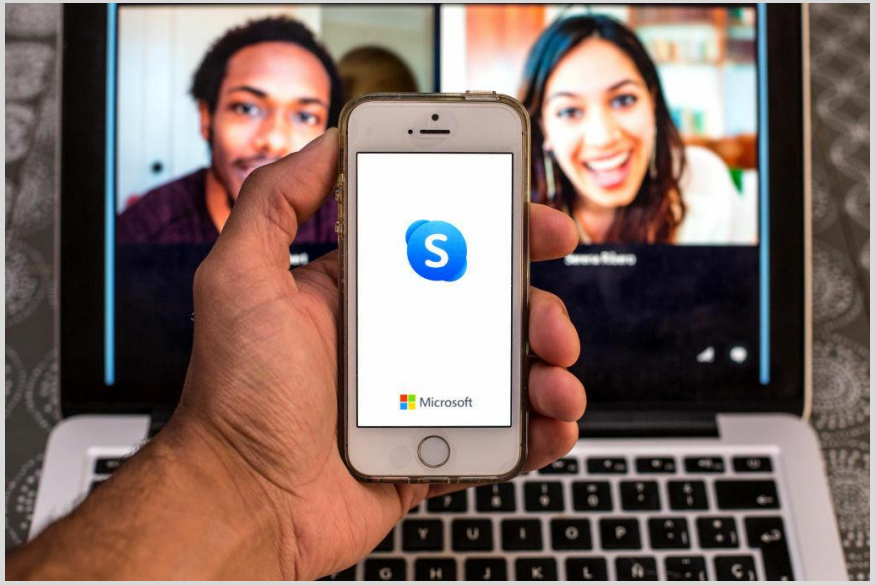
# Infrastructure

- SMS & VoIP services
- Domains
- Website Hosting services
- VPNs
- VPSs
- Public text paste sites
- File-sharing cloud services
- Telegram
- Bitcoin wallets

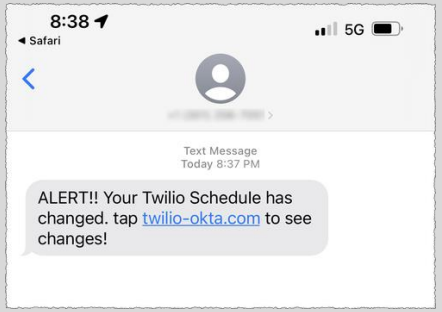
# Infrastructure: SMS for phishing and VoIP for vishing

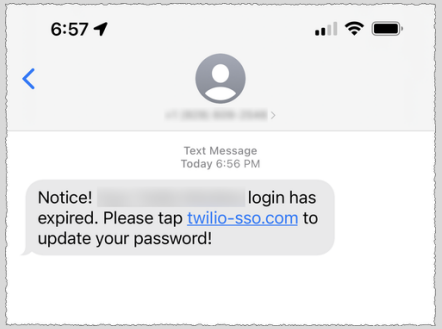


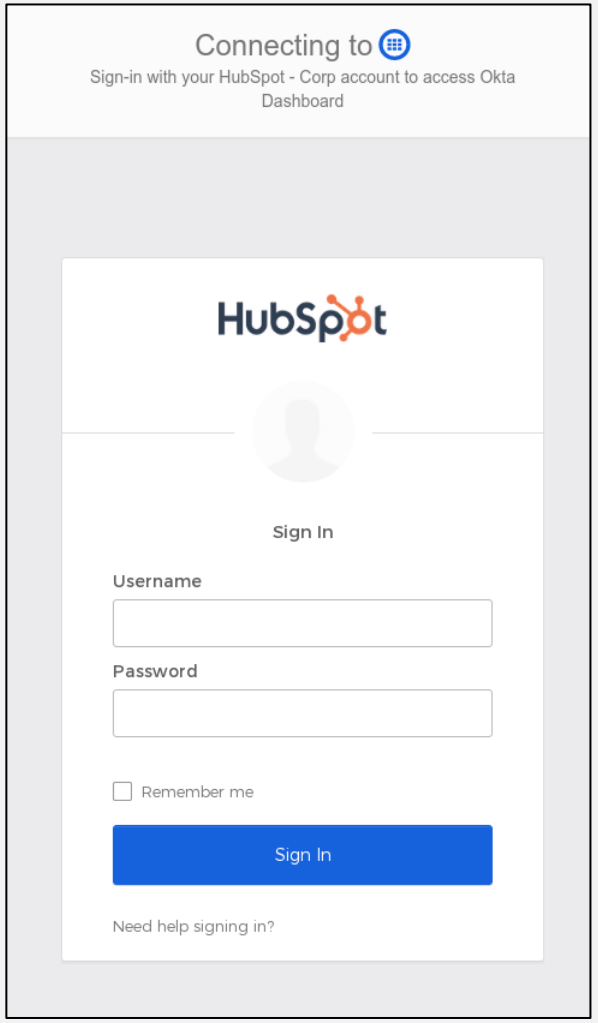



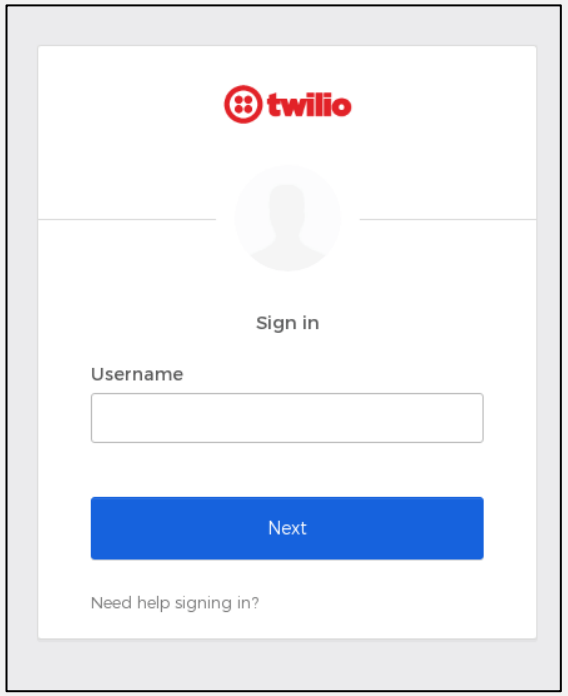



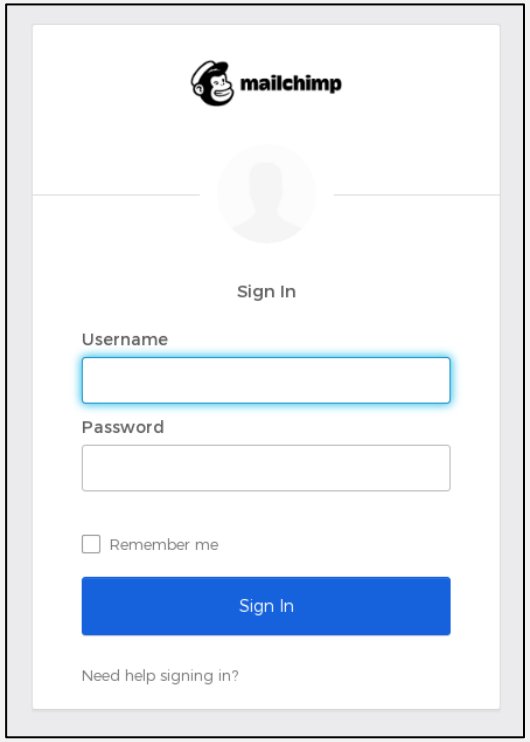

- Communications Platform-as-a-Service
- Google Voice
- Skype
- Vonage (formerly Nexmo)
- Bandwidth

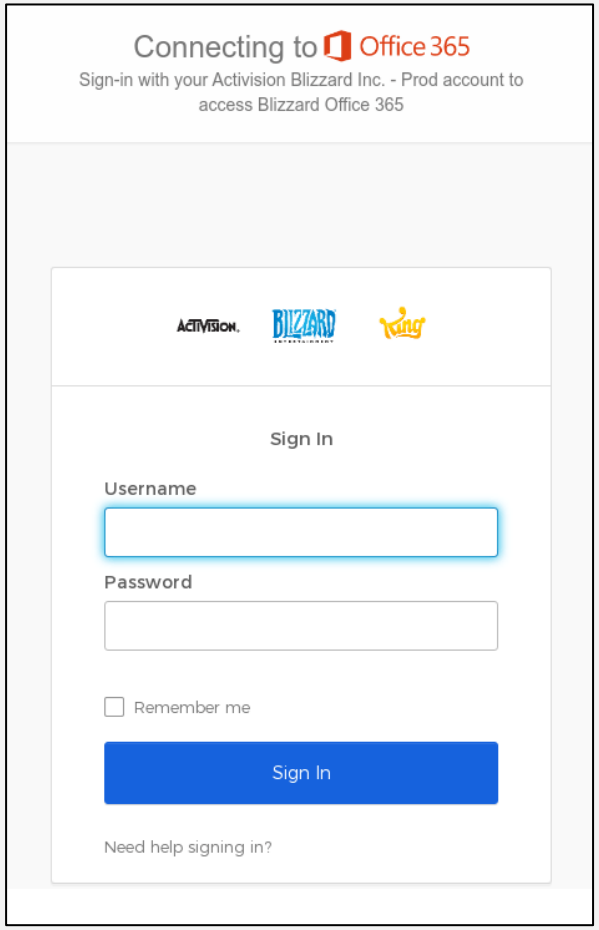


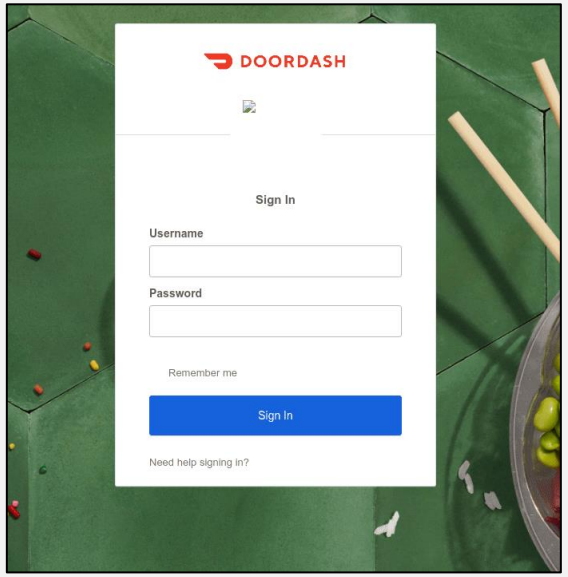



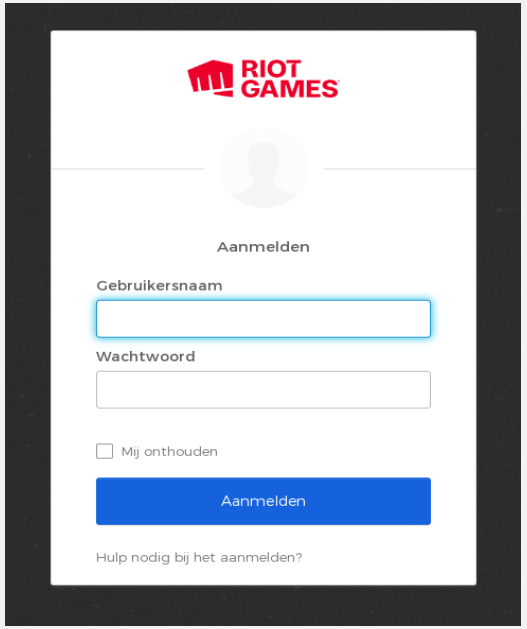



Noticed that the same phishing kit is used for each fake login page

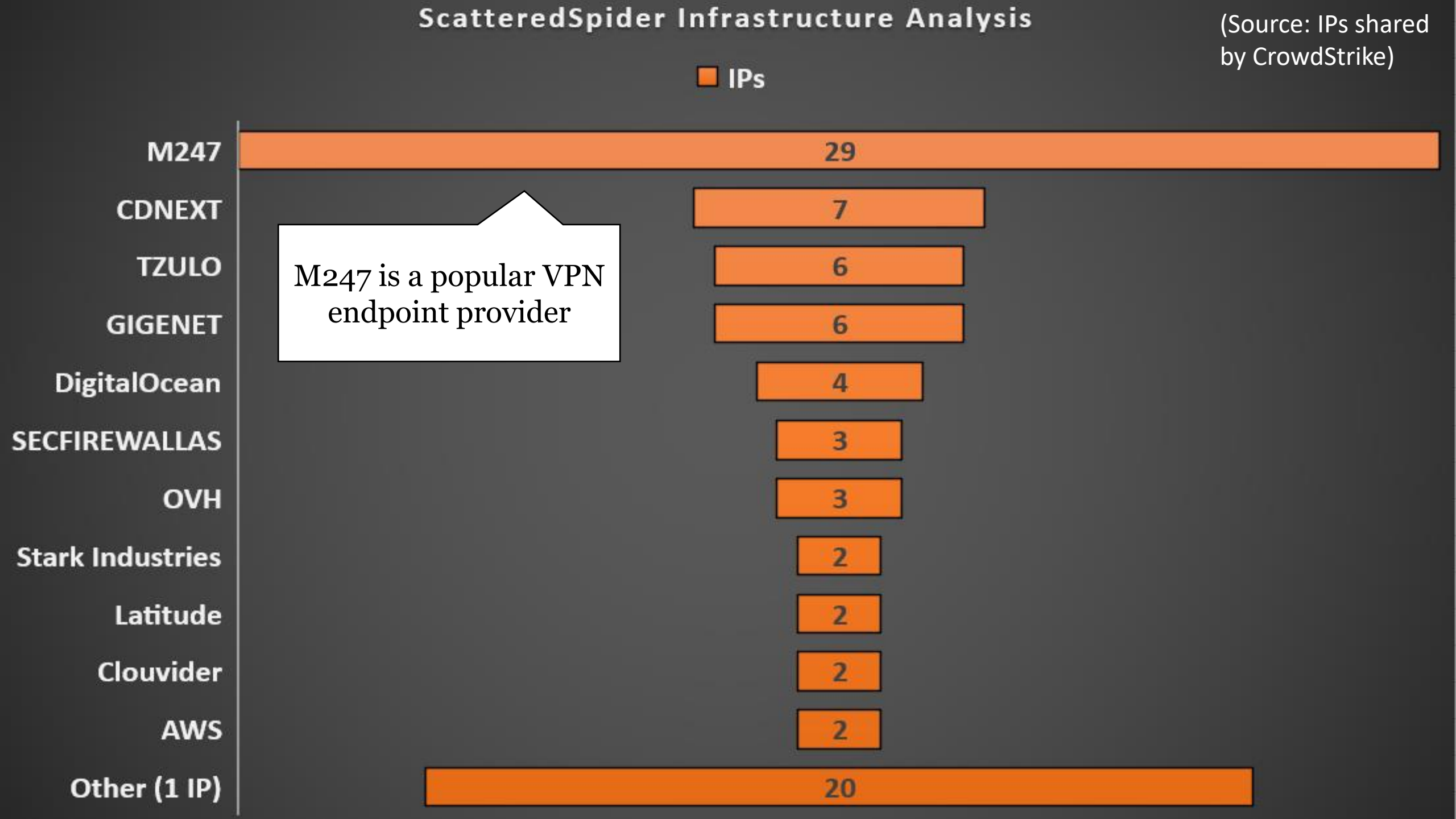
Infrastructure:
SMS phishing pages posing as Single Sign-On (SSO) authentication logins

# Infrastructure:
# Domains linked to SSO and Okta themed phishing pages

| | | | |
|---|---|---|---|
| stargate-sso.co | okta-teams.com | grubhub-care.com | tmo-corp.com |
| stargate-sso.net | okta-access.com | grubhub.carebear-sso.com | t-ticket.tk |
| mcointernal-sso.com | oktaservice.com | grubhub-sso.com | t-helpdesk.tk |
| opensea-sso.com | oktasignin.com | grubhub.desk-prod.com | t-tickets.tk |
| luno-sso.com | riotgames-inc.com | segment-sso.com | t-tickets.com |
| okcoin-sso.com | riotgames-sso.com | segment.corplogon.com | tsp-tmo.com |
| reddit-sso.com | riot-sso.net | arise-sso.com | rss-tmo.com |
| sso-rbx.com | riotgames.team | arise.employee-cloud.com | rtt-tmo.com |
| sso-serverplan.com | corp-mailgun.com | bandwidth-sso.com | tmohelp.me |
| riot-sso.net | sso-mailgun.com | bandwidth.employees-cloud.com | tmoconnect.vip |
| sso-osp.live | service-mailgun.com | approve-sparkpost.com | t-rsa.com |
| sso-activecampaign.com | service-sendgrid.com | timetable-sparkpost.com | tmopanel.online |
| activecampaign-sso.com | sso-cbhq.com | calendar-sparkpost.com | tmo-panel.live |
| sso-cloud.com | sso-cb.com | schedule-sparkpost.com | t-nsa.com |
| networksolutions-sso.com | sso-sforce.com | workday-sparkpost.com | t-eit.info |
| riot-sso.com | lesschwab.cloud-auth.org | discord-okta.com | tmoeit.com |
| digicert-sso.com | drop-boxhr.com | discord.sso.okta.vip | calendar-tmo.com |
| segment-sso.com | sso-mcvpn.com | identity.mgmresurts.com | tmo-tickets.com |
| bandwidth-sso.com | sso-mchimp.com | benefits.mgm-resorts.health | t-rss.us |
| grubhub-sso.com | mailchimp.mcadmln.com | mgrmresorts.co | t-rss.com |
| gemini-stargate.com | mailgun-sso.com | mgmresortsapp.com | tmobile-eit.com |
| cloudsso-prod.com | digicert-sso.com | mgmresorts-okta.com | tmobile.vip |
| riotgames-sso.com | digicert.cloudsso-prod.com | schedule.mgmresorthotels.com | tmobiledesk.support |

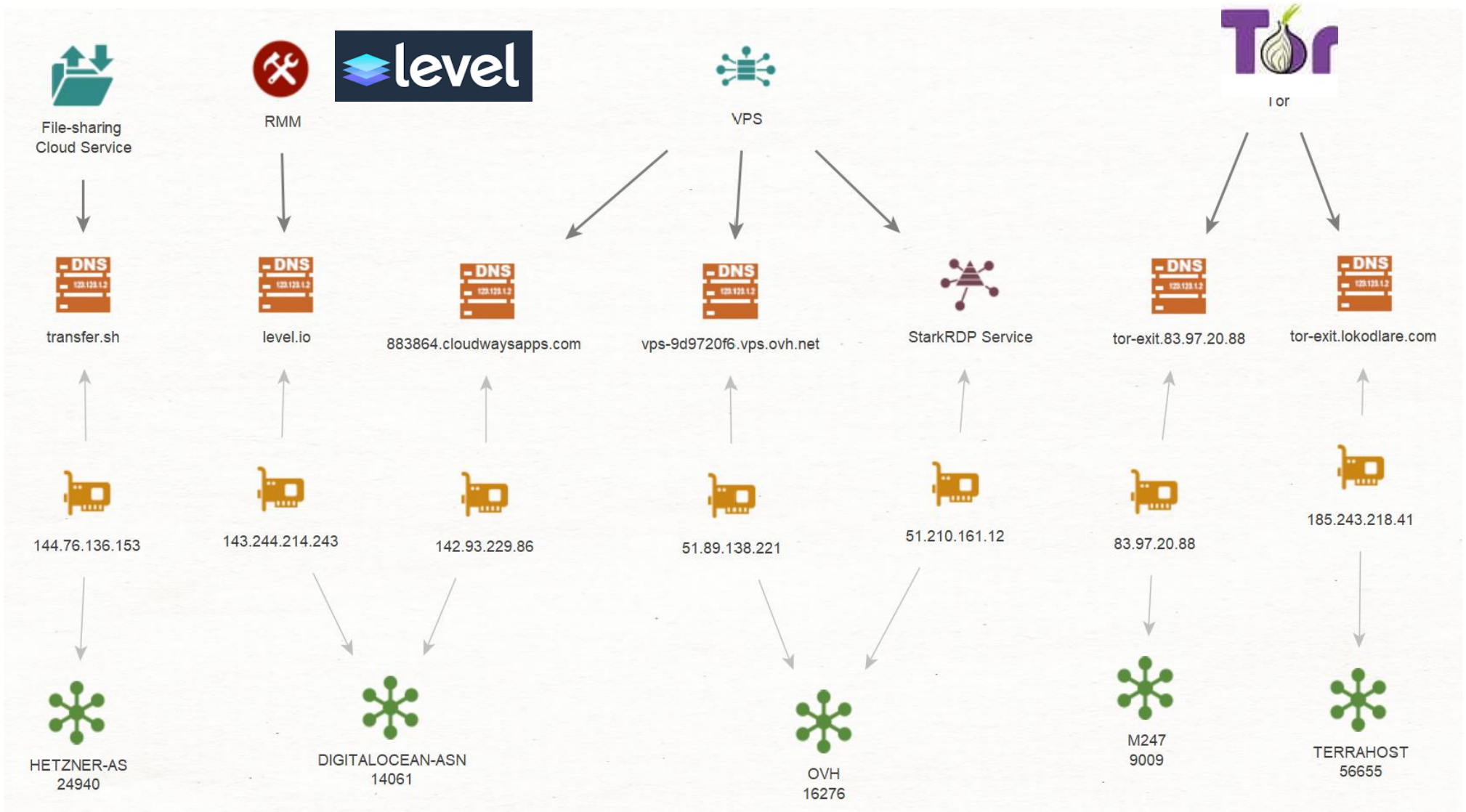
Patterns: “sso”, “okta”, “cloud”

Registrars: NameSilo, Tucows, Njalla


ScatteredSpider Infrastructure Analysis
(Source: IPs shared by CrowdStrike)
IPs
M247
CDNEXT
TZULO
GIGENET
DigitalOcean
SECFIREWALLAS
OVH
Stark Industries
Latitude
Clouvider
AWS
Other (1 IP)
29
7
6
6
4
3
3
2
2
2
2
20
M247 is a popular VPN endpoint provider

# Infrastructure: Services

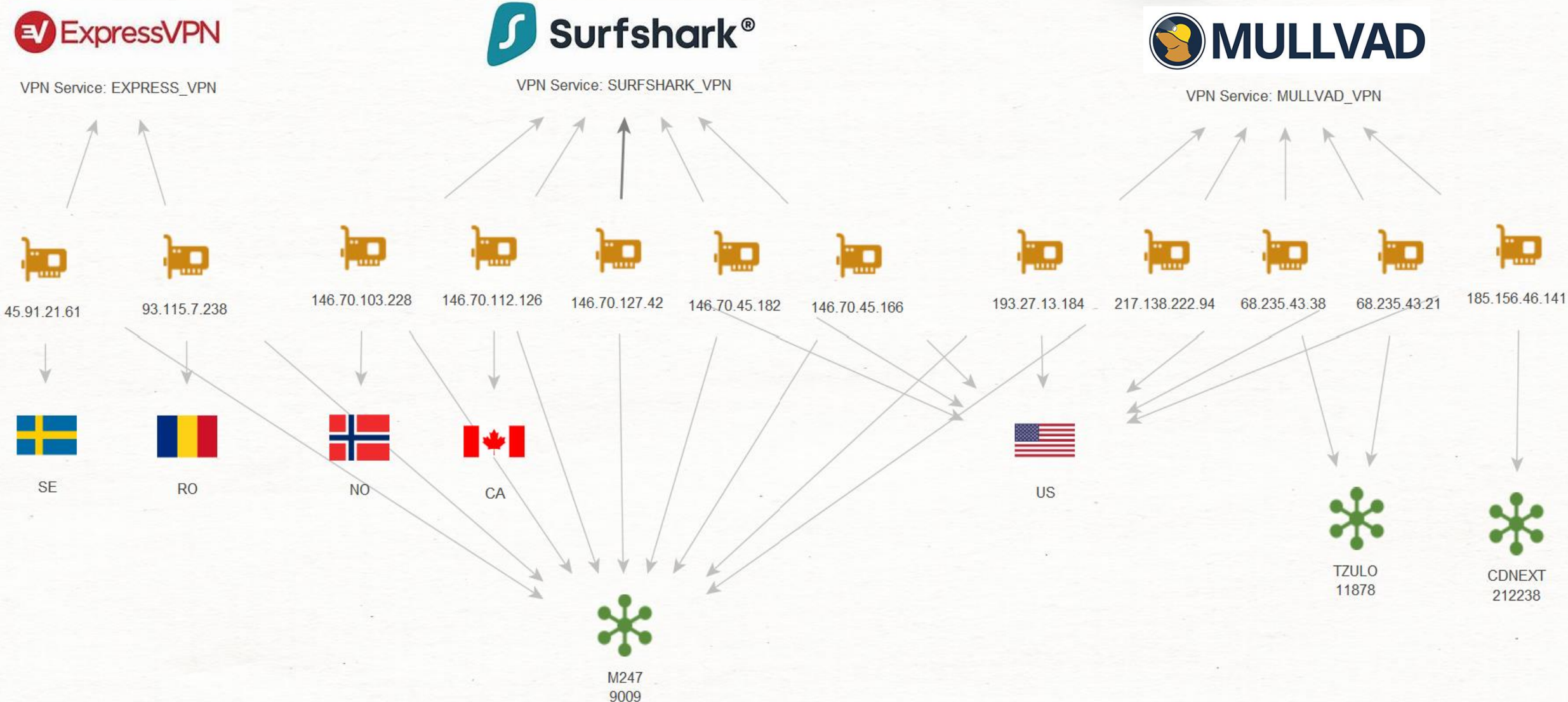
(Source: IPs shared by CrowdStrike)



# Infrastructure: VPNs

All the VPNs accept Bitcoin as payment for accounts

(Source: IPs shared by CrowdStrike)



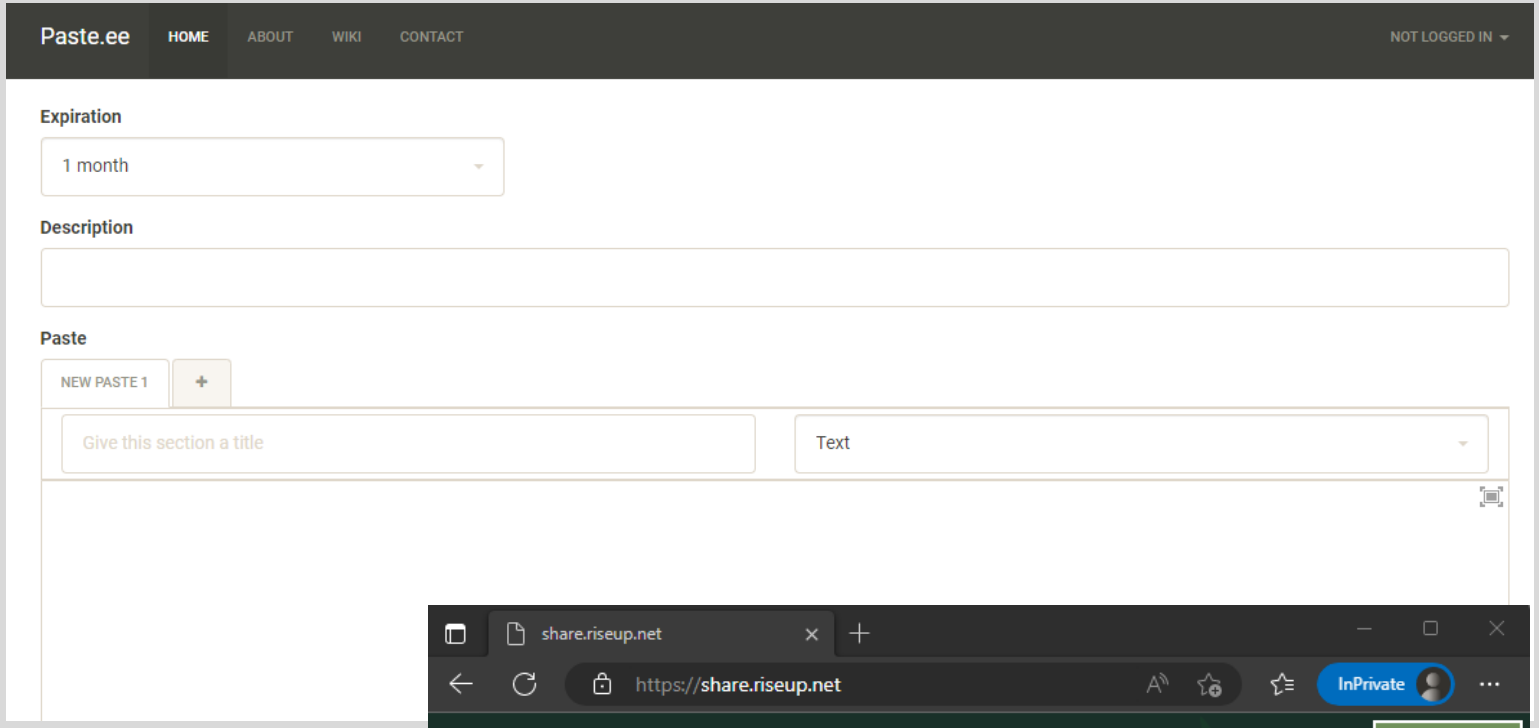
# File-sharing Sites

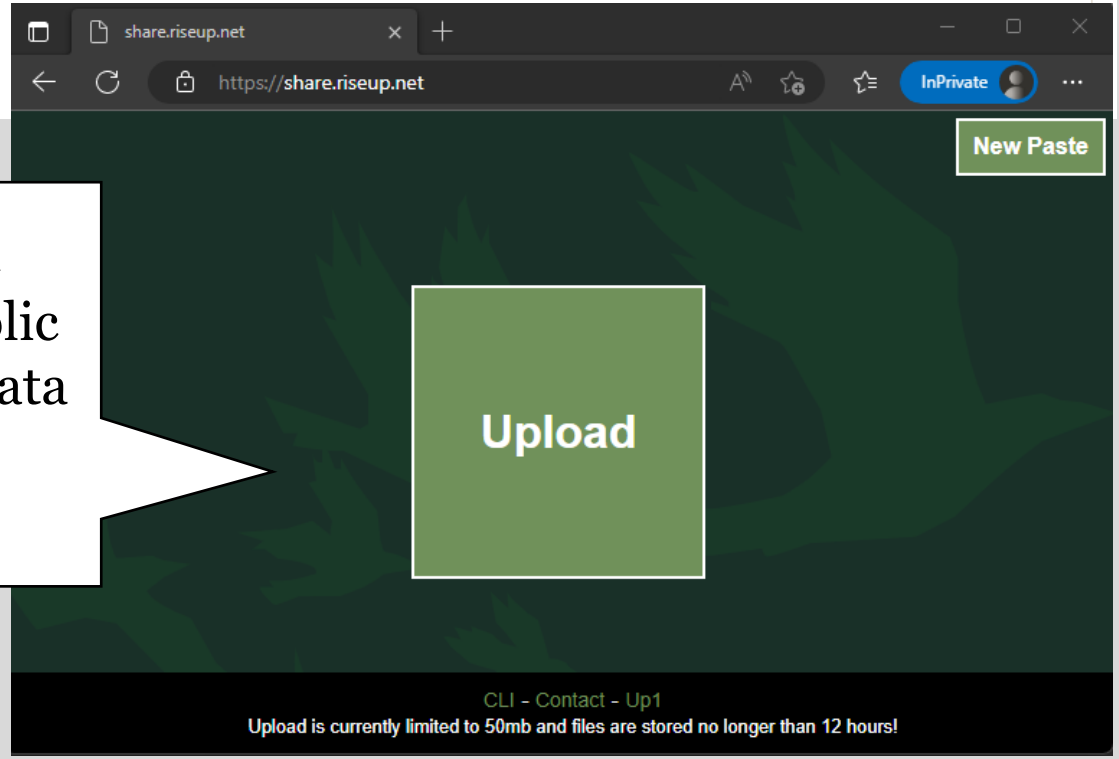
Public text paste sites

- Paste[.]ee, Riseup[.]com

File-sharing cloud services

- Transfer[.]sh, File[.]io, Github[.]com



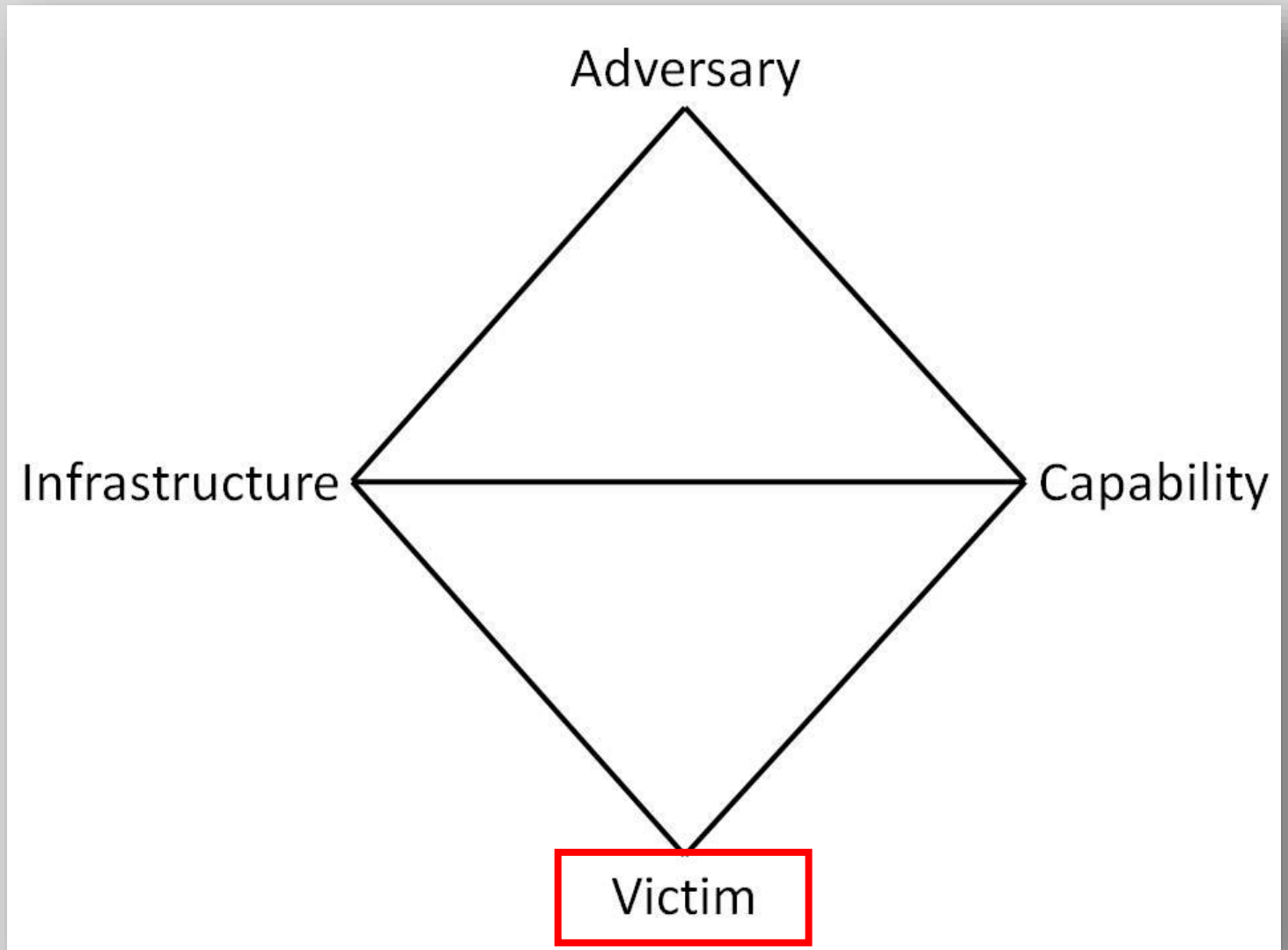



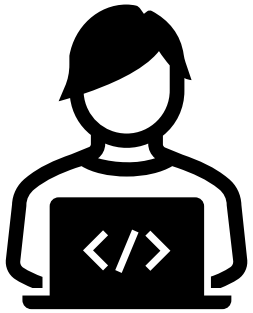

Free way to store payloads in the public cloud or exfiltrate data from inside the network

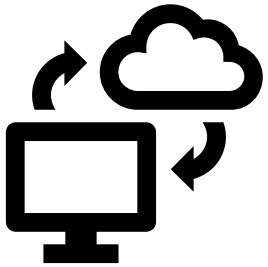
# Oktapus/ ScatteredSpider Victims

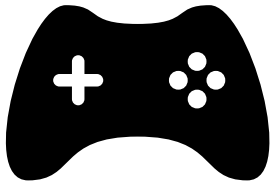
- Region
- Sector
- Systems
- People
- Information

## Victims of Attacks









# Victims

**Targeted Regions**

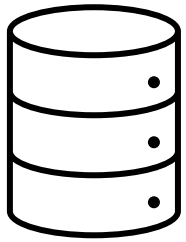
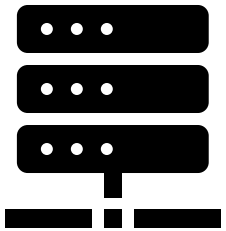
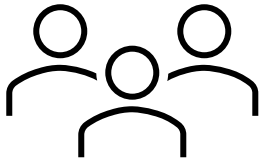
- Mainly North America
- Few in EMEA and APAC

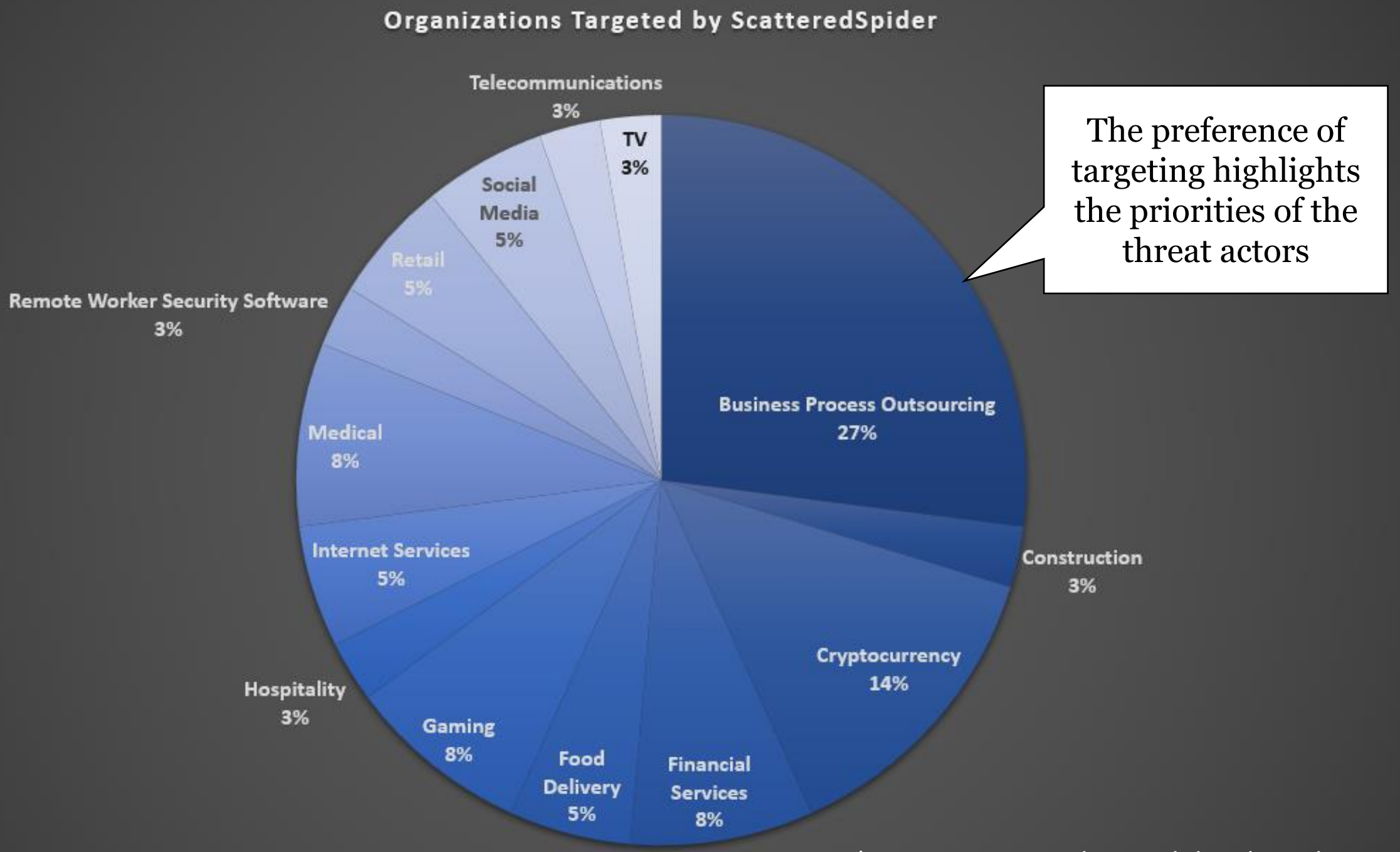
**Targeted sectors**

- Business Process Outsourcing (BPO)
- Software-as-a-Service
- Customer Data Platform (CDP), Customer Relationship Management (CRM), Email Marketing
- Telecommunications
- Communications Platform-as-a-Service (PaaS) that offer SMS and VoIP
- Cryptocurrency Exchanges
- Gaming Developers or Publishers
- Social Media Platforms
- Food Delivery

# Victim Demographics

| People targeted | Systems targeted | Information targeted |
| --- | --- | --- |
| • Employees at large organizations<br>• IT Staff<br>• Software Developers | • Software-as-a-Service<br>• Collaboration Applications<br>• Code Repositories | • Source Code<br>• File Shares<br>• Cryptocurrency Private Keys |


(Source: URLscan data and data breach reports)

# Impact to Victims

## Twilio

- Employee account was compromised
- **163 Twilio customers**
- Customer contact information from user account details was stolen
- **SMS OTP information** related to a limited number of customer accounts was also accessed

## DoorDash

- Gained access to **internal tools** via Twilio
- Accessed a small number of users' name, email address, delivery address and phone number
- Accessed a smaller set of consumers' basic order information and partial payment card information

## Okta

- A small number of mobile phone numbers and associated **SMS messages** containing the **one-time passcodes** were accessible to the threat actor
- The threat actor gained access via the **Twilio console**

## HubSpot

- An employee account was compromised
- Company **HubSpot portals** were accessed
- Affected firms: Swan and BlockFi
- Financial data and funds of their customers weren't affected, but **personal information** was likely exposed

# Impact to Victims (continued)

## Cloudflare

- 76 employees were targeted in 1 minute
- Three employees entered their credentials
- FIDO2-compliant YubiKeys are required for authentication **stopped the attack**

## Coinbase

- One employee entered their credentials
- The SSO MFA requirement **locked the attacker out**
- The employee was called by the attacker and **socially engineered** into giving them access
- Other **Coinbase employee details** were accessed

## Activision

- One employee's account was compromised
- **Employee personal information** was stolen by the attackers
- Data related to Activision's Call of Duty franchise **was accessed** and screenshots were shared online

## RiotGames

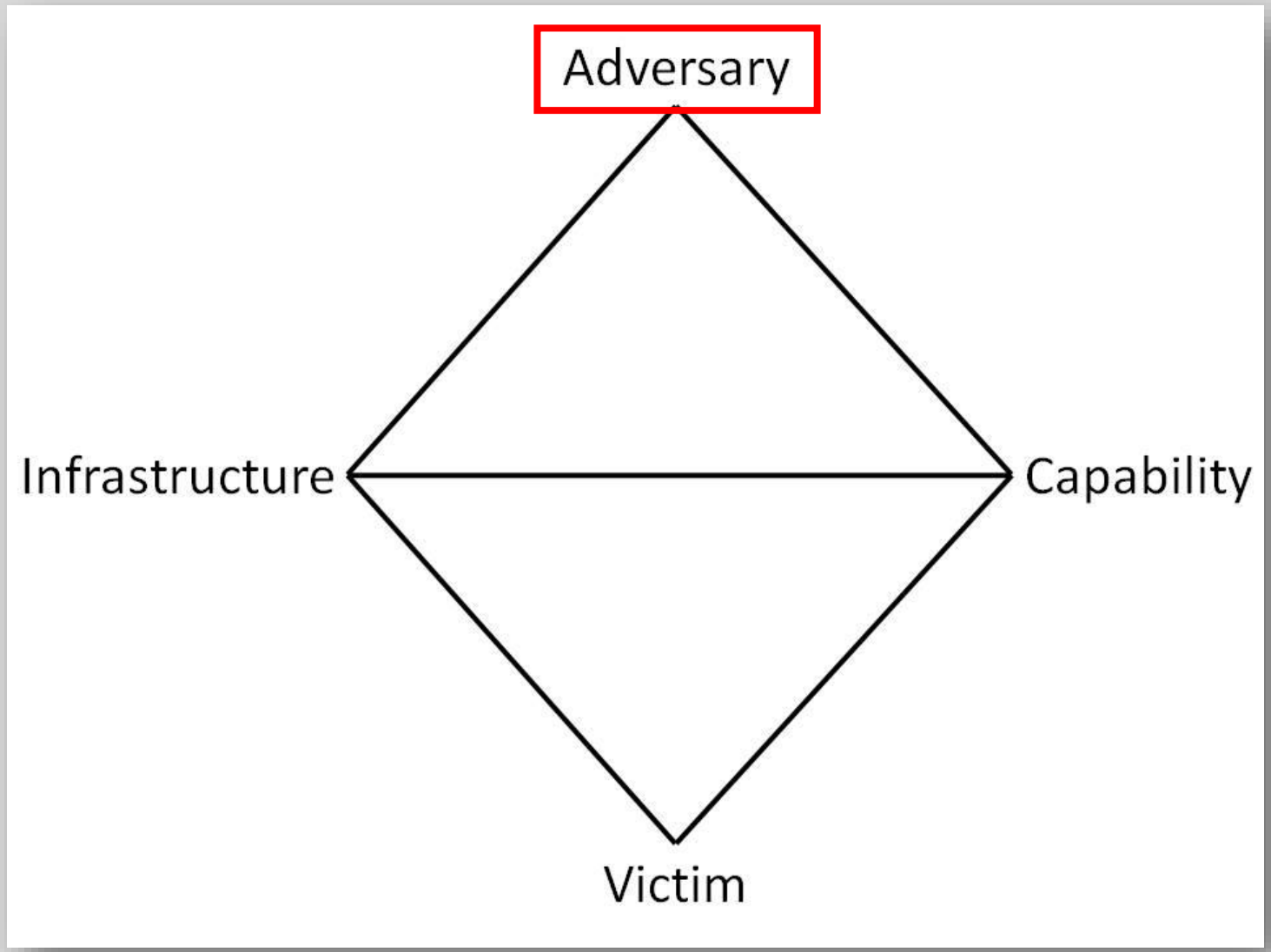
- An employee was access to the **development environment** was phished
- **Source code** for League of Legends and Teamfight Tactics, as well as the company's legacy anti-cheat system was stolen
- **$10 million USD ransom** was demanded

# Oktapus/ ScatteredSpider

# The Adversaries

- Attributes
- Objectives
- Who?

## Completing the Diamond



# Adversary

Aliases

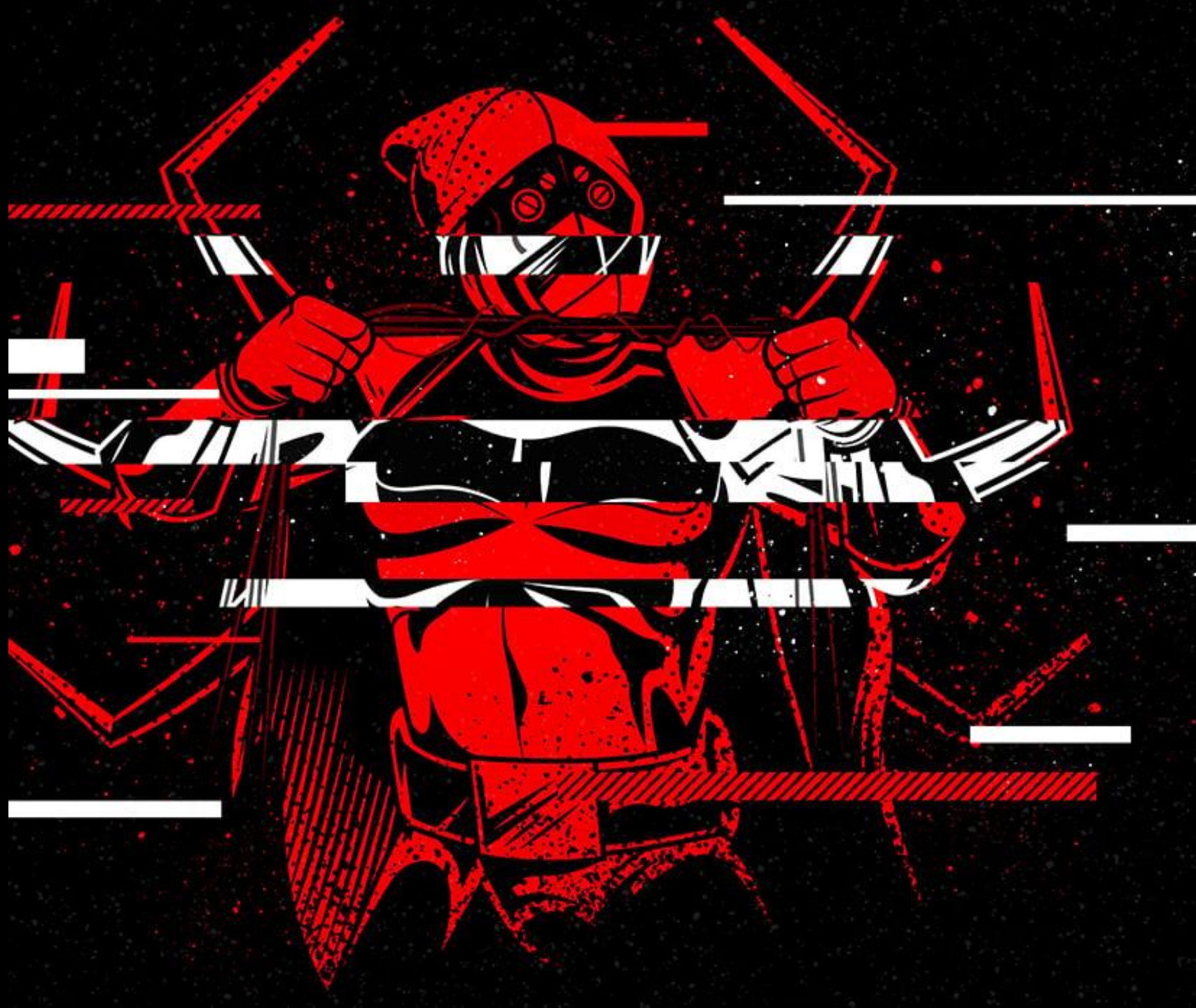
- 0ktapus (Group-IB)
- SCATTERED SPIDER (CrowdStrike)
- UNC3944 (Mandiant)

Attributes

- English-speaking
- Likely young adolescents
- Financially motivated

Objectives

- Data Exfiltration
- Source Code Theft and Extortion
- Cryptocurrency Theft



# Adversary Summary

- Not too technologically advanced but rehearsed in enterprise-level security protection systems
- Has a focus on social engineering and targeting the human factor of security
- They do not develop their own malware or tools, they either use free or trial software or purchase it from the cybercrime underground

- **Important Final Assessment:**

  This adversary should be treated more like a community of threat actors – rather than tracked as a monolithic entity – due to the wide range of TTPs, targets, and actions on objectives

*0ktapus*
*ScatteredSpider*
*UNC3944*

English-speaking
Financially motivated

**Adversary**

**Infrastructure**

**Capabilities**

*SMS and VoIP services*
*SSO-themed domains*
*Paste Sites*
*VPNs*
*Bitcoin Wallets*

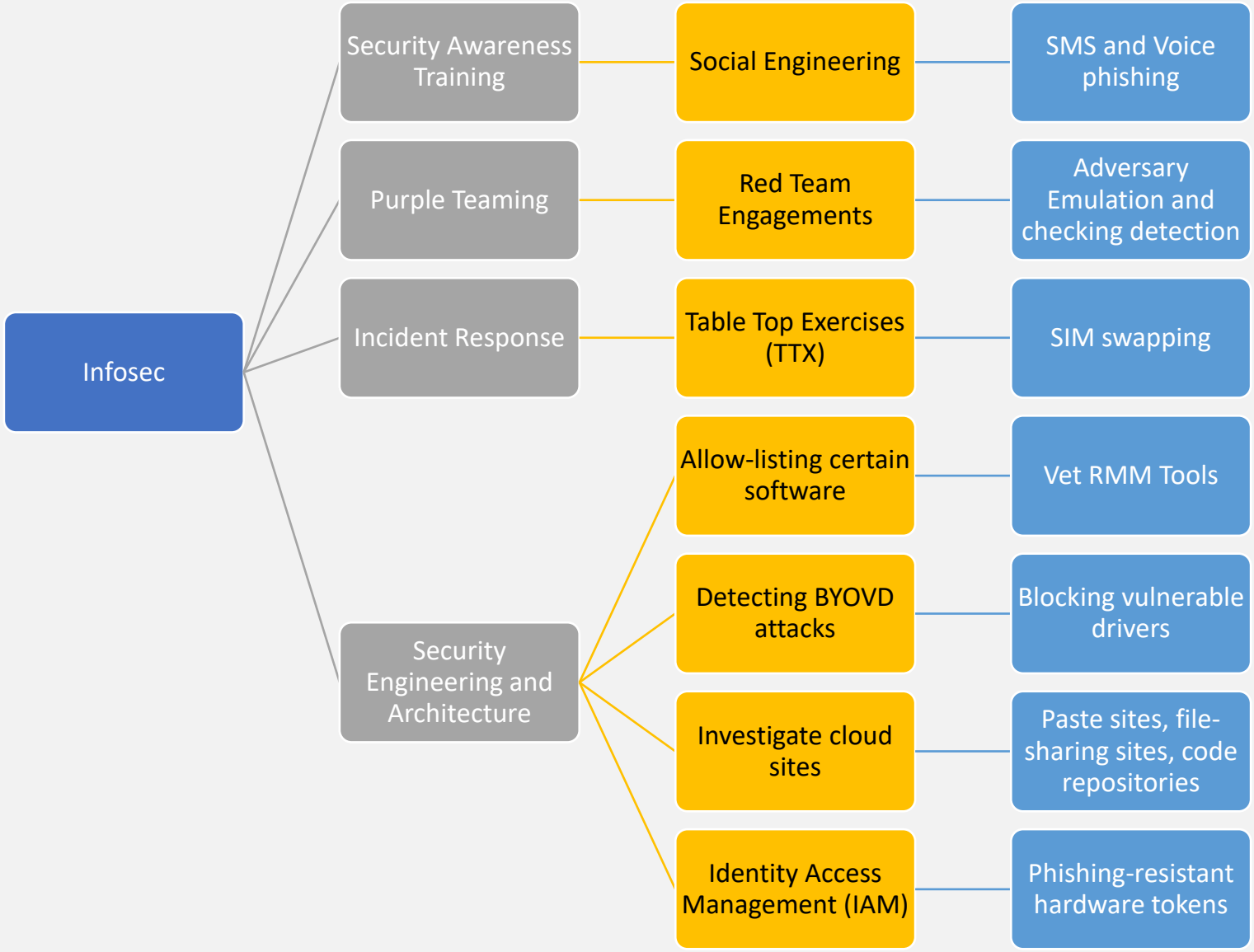
*Social Engineering*
*SMS phishing*
*Vishing*
*Site Cloning*
*RMM Tools*
*Proxies*
*BYOVD*
*UEFI Bootkit*
*OSINT*
*Breach Data*

**Victim**

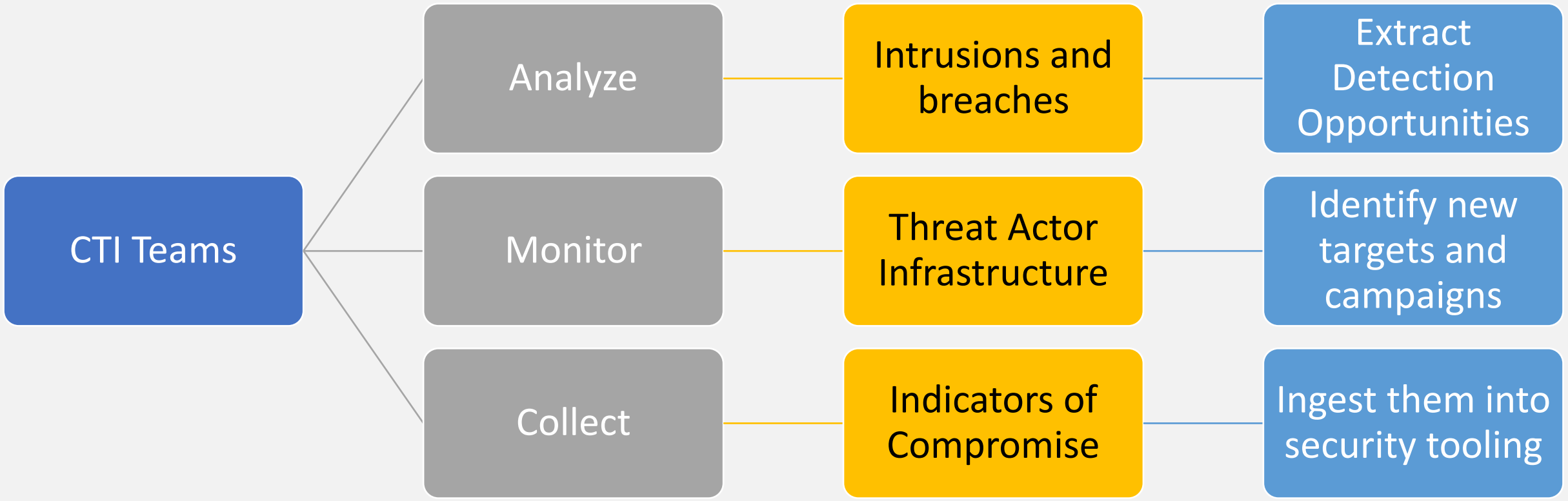
*Business Process Outsourcing (BPO)*
*Telecommunications*
*Gaming and Social Media*
*Cryptocurrency*
*Software Source Code*

# Completing the Diamond

# Mitigating these attacks before they happen:



# How Cyber Threat Intelligence can help:



# Thanks for Listening!

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- sans.org/profiles/will-thomas
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