



# THREAT ANALYSIS

## **LATEST CYBER ESPIONAGE MALWARE ATTACKS**

**DRAGONFISH** DELIVERS NEW FORM OF **ELISE**  
MALWARE TARGETING **ASEAN DEFENCE**  
**MINISTERS' MEETING** AND ASSOCIATES

The well-known threat group called DRAGONFISH or Lotus Blossom are distributing a new form of Elise malware targeting organizations for espionage purposes. The threat actors associated with DRAGONFISH have previously focused their campaigns on targets in Southeast Asia, specifically those located in countries near the South China Sea. These attacks have mainly targeted high-profile government, military and political institutions, but other victims include those operating in the education and telecommunication industries. iDefense analysts have identified a campaign likely to be targeting members of—or those with affiliation or interest in—the ASEAN Defence Ministers’ Meeting (ADMM).

This threat analysis provides security operations center (SOC) analysts and engineers with detailed information pertaining to the workings of the Elise malware family and the indicators of compromise (IoCs) to assist them in their own independent analyses.

This threat analysis will help to inform organizations and support their decision making on how to better contain or mitigate the threat through monitoring or blocking.

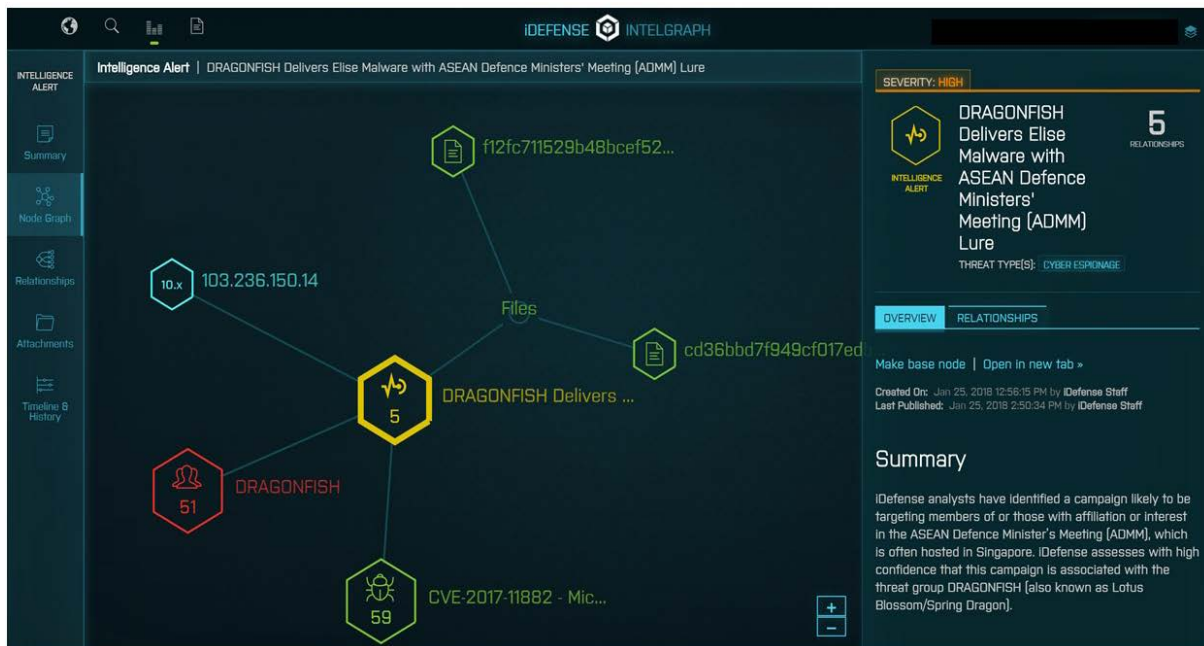
They may consider using the information to inform hunting activities for systems that may already have been compromised, or by using the IoCs by adding them to hunting lists or endpoint detection & response (EDR) solutions as well as to network- and host-based backlists to detect and deny malware implantation—and command and control (C2) communication—or whatever mitigations they determine are most appropriate for their environments.

Given the inherent nature of threat intelligence, it is based on information gathered and understood at a specific point in time.

# TECHNICAL REPORT

## DESCRIPTION

iDefense analysts have identified a campaign likely to be targeting members of or those with affiliation or interest in the ASEAN Defence Minister's Meeting (ADMM). iDefense assesses with high confidence that this campaign is associated with the threat group DRAGONFISH (also known as Lotus Blossom and Spring Dragon).



## MALWARE ANALYSIS

Knowledge of DRAGONFISH's tactics, techniques, and procedures (TTPs) helps to better inform detection and response to attacks by this threat group.

The sample iDefense identified is a malicious Microsoft Corp. Word document (see Exhibit 1) with the following properties:

- **MD5:** f12fc711529b48bcef52c5ca0a52335a
- **Author:** mary
- **Last Modified by:** mary
- **Created Time Stamp:** 2018:01:19 14:56:00 (Jan. 19, 2018, 2:56 p.m.)
- **Last Modified Time Stamp:** 2018:01:19 14:56:00 (Jan. 19, 2018, 2:56 p.m.)

**Exhibit 1:** Decoy Document

id	index	OLE Object	OLE Package
0	0000326Fh	format_id: 2 (Embedded) class name: 'Package' data size: 72889	Filename: 'a.b' Source path: 'E:\\office\\a.b' Temp path = 'C:\\Users\\mary\\AppData\\Local\\Temp\\a.b'

The Word document, which includes information on ADMM-Plus members, has a malicious executable file embedded as an OLE object (see Exhibit 2).

**Exhibit 2:** Original Source Path

**ADMM-Plus Defence Officials Directory**

Monday, 07 August 2017 02:51

ADMM-Plus Countries	Defence Ministers	Defence Senior Officials	Defence Working Group Officials
Brunei Darussalam	His Majesty Sultan Haji Hassanal Bolkiah Mu'izzaddin Waddaulah ibni Al-Marhum Sultan Haji Omar Ali Saifuddin Sa'adul Khairi Waddien Minister of Defence	Capt. (Retired) Abd Rahman bin Begawan Mudim Dato Paduka Haji Bakar Permanent Secretary Ministry of Defence	Mr. Haji Adi Ithram bin Dato Paduka Haji Mahmud Director of Defence Policy, Directorate of Defence Policy Ministry of Defence Fax: 673 2386 872
Cambodia	H.E. Gen. Tea Banh Deputy Prime Minister and Minister of National Defence	Gen. Neang Phat Secretary of State Ministry of National Defence	Maj. Gen. Lay Chenda Director of ASEAN Affairs Department Ministry of National Defence Fax: 855 23 880 402

The embedded file named **a.b** is dropped to the **%temp%** folder once the Word document is opened and is executed by exploiting the CVE-2017-11882 vulnerability. The payload is consequently moved to **\AppData\Roaming\Microsoft\Windows\Caches\** as a file named **NavShExt.dll** and the executable **a.b** is deleted.

This file **NavShExt.dll** is a PE32 dynamic-link library (DLL), and the filename suggests that the malware author intended to disguise the file as a legitimate Symantec Corp. anti-virus component called the Norton Security Shell Extension Module.

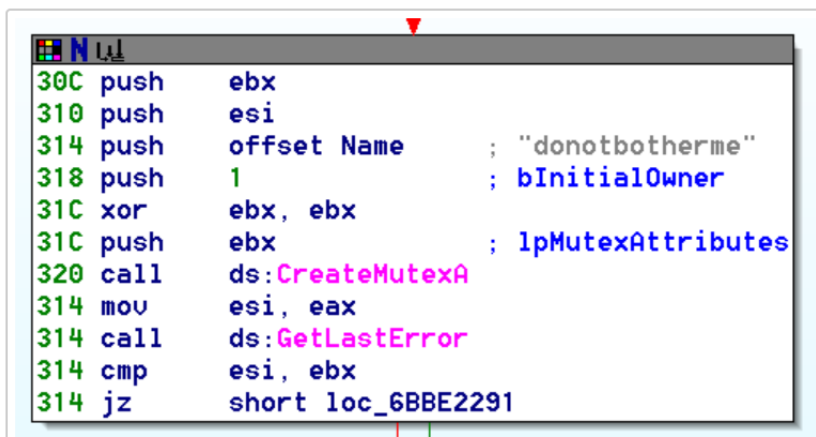
The DLL has the following properties:

- MD5 Hash: **cd36bbd7f949cf017edba0e6aaadf28c**
- Compile Time: **2018-01-12 17:59:58 (Jan. 12, 2018, 5:59 p.m.)**
- Export Function: **Setting**

The malware performs the following set of actions:

1. Starts `iexplore.exe` (Internet Explorer) in a suspended state
2. Injects `NavShExt.dll` into the `iexplore.exe` process and calls the DLL export `Setting` function
3. The `iexplore.exe` process continues to run in the background
4. Creates a mutex named `donotbotherme` (see Exhibit 3) to avoid having duplicated executions
5. Creates a file named `thumbcache_1CD60.db` in `AppData\Local\Microsoft\Windows\Explorer\` where the harvested data is stored
6. Sends data to and downloads files and commands from the designated C2 server
7. Harvests extensive system information from the machine, such as the following:
  - LAN and WAN IP addresses (for the latter, it uses the free IP address service `ipaddress.com`)
  - Proxy information
  - Installed software list
  - Process enumeration via `tasklist`
  - List of all the files on the user's desktop

### Exhibit 3: Mutex Creation

A screenshot of a debugger window showing assembly code for mutex creation. The code is as follows:

```
30C push    ebx
310 push    esi
314 push    offset Name      ; "donotbotherme"
318 push    1                ; bInitialOwner
31C xor     ebx, ebx
31C push    ebx              ; lpMutexAttributes
320 call    ds:CreateMutexA
314 mov     esi, eax
314 call    ds:GetLastError
314 cmp     esi, ebx
314 jz     short loc_6BBE2291
```

Based on the currently available intelligence we also believe the malware is capable of providing the attacker with a remote shell on the host and can completely uninstall itself.

Execution debug messages are stored in the `%temp%` folder in a file named `FXSAPIDebugLogFile.tmp`. Example messages include `Client Start!`, indicating a

successful infection, or an error message such as [2018-1-25 13:35:22] Try All Addr Failed! Sleep For: 10.100000 Minutes!, indicating that the C2 sever cannot be reached and the malware will sleep for a fixed amount of time.

Logs are encrypted using the following static AES key:  
Ss)4:WksRr(3/VJrQq&2.UlqPp%1-THp.

Of particular interest is an embedded, custom application in a .data section that is responsible for loading and executing executables and DLLs from inside the main binary. The application supports the following command-line options:

- runexe 1.exe /c command...
- rundll 1.dll, DllMain

When attempting to find more information about this application, iDefense discovered a file with the MD5 hash cfa7954722d4277d26e96edc3289a4ce, which features the same application and was mentioned in a 2015 report titled *Operation Lotus Blossom* by the Unit42 team at partner organization Palo Alto Networks.

Several observations detailed in this report on Elise variant C align with the findings disclosed above:

- Similar targeting of Southeast Asia
- Same export function name in the dropper DLL: Setting
- Identical custom application to load and execute EXEs or DLLs
- Heavy anti-virtual-machine features
- Similar obfuscation techniques used to exfiltrate data to C2 server (using base64-encoded cookie values)

In contrast to the earlier campaigns, debug paths are completely stripped. Persistence is achieved using the Run Registry key with the value name IAStorD:

- HKCU\Software\Microsoft\Windows\CurrentVersion\Run\IAStorD

As mentioned earlier, two hidden DLLs can be discovered that are additionally injected into iexplore.exe and have the export functions named DePatchEntry or EvilEntry. These DLLs provide additional loading and other anti-analysis functionalities.

The malware attempts to spoof the host and query non-existing domains, such as the following:

- 3qyo4o7.7r7i3[.]info
- dtdf5vu.nt7yq[.]info
- j.4tc3ldw.g9ml.www0[.]org
- 38qmk6.0to9[.]info
- ubkv1t.ec0[.]com

- 7g91xhp.envuy3[.]net
- l.hovux.eln9wj7.7gpj[.]org
- w.7sytdjc.wroi.cxy[.]com

This is likely done to throw off malware analysts or network administrators. The real C2 server, **103.236.150[.]14**, is actually hardcoded (see Exhibit 4).

**Exhibit 4: Real C2 Server Hardcoded in the Malware**

The screenshot displays a debugger window with assembly code on the left and a memory dump on the right. The assembly code includes instructions such as `push omoru ptr`, `mov dword ptr`, and `call shlwapi.76529c50`. The memory dump shows a string of characters, including the URL `http://103.236.150.14/ibmf/vgio.xml`.

Address	hex	ASCII
76572438	68 00 74 00 74 00 70 00	h.t.t.p.:./././.
76572448	30 00 23 00 2c 00 32 00	0.3...2.3.6...1.
76572458	25 00 20 00 25 00 31 00	5.0...1.4./././.
76572468	68 00 09 00 66 00 2f 00	m.i.f./v.g.i.o.
76572478	2c 00 18 00 60 00 6c 00	...x.m.l...w.d.a.
76572488	00 00 00 00 00 00 36 00	...=6.q.z.r.z.
76572498	75 00 00 00 74 00 10 00	u.a.t.m.3.1.1.1.
765724a8	69 00 72 00 00 00 74 00	t.r.t.t.a.e.s...
765724b8	00 00 00 00 00 00 00 00	.....yyyyy...Iv
765724c8	00 00 00 00 00 00 00 00	.....
765724d8	00 00 00 00 00 00 00 00	.....
765724e8	00 00 00 00 00 00 00 00	.....
765724f8	00 00 00 00 00 00 00 00	.....
76572508	ff ff ff ff 00 00 00 00	.....
76572518	00 00 00 00 00 00 00 00	.....

## MITIGATION

To mitigate the threat of the described campaign, security teams can consider blocking access to the C2 server **103.236.150[.]14** and, where applicable, ensure that the Microsoft Security Update KB2553204 is installed in order to patch the CVE-2017-11882 vulnerability.

For threat hunting, iDefense also suggests that analysts to look for the following artifacts:

- A value named **IAStorD** in the autorun key
- A file named **FXSAPIDebugLogFile.tmp**
- A mutex handle named **donotbotherme**
- **thumbcache\_1CD60.db** in **AppData\Local\Microsoft\Windows\Explorer\**

For further information regarding the Microsoft Security Update KB2553204, please visit:

<https://support.microsoft.com/en-us/help/2553204/description-of-the-security-update-for-office-2010-november-14-2017>

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## CONTACT US

For additional mitigation steps and more detailed information, please reach out to your Accenture contact. Where support is needed, Accenture Security can provide resources designed to mitigate risks and remediate gaps in ICS security programs.

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