New pastebin-like service used in multiple malware campaigns

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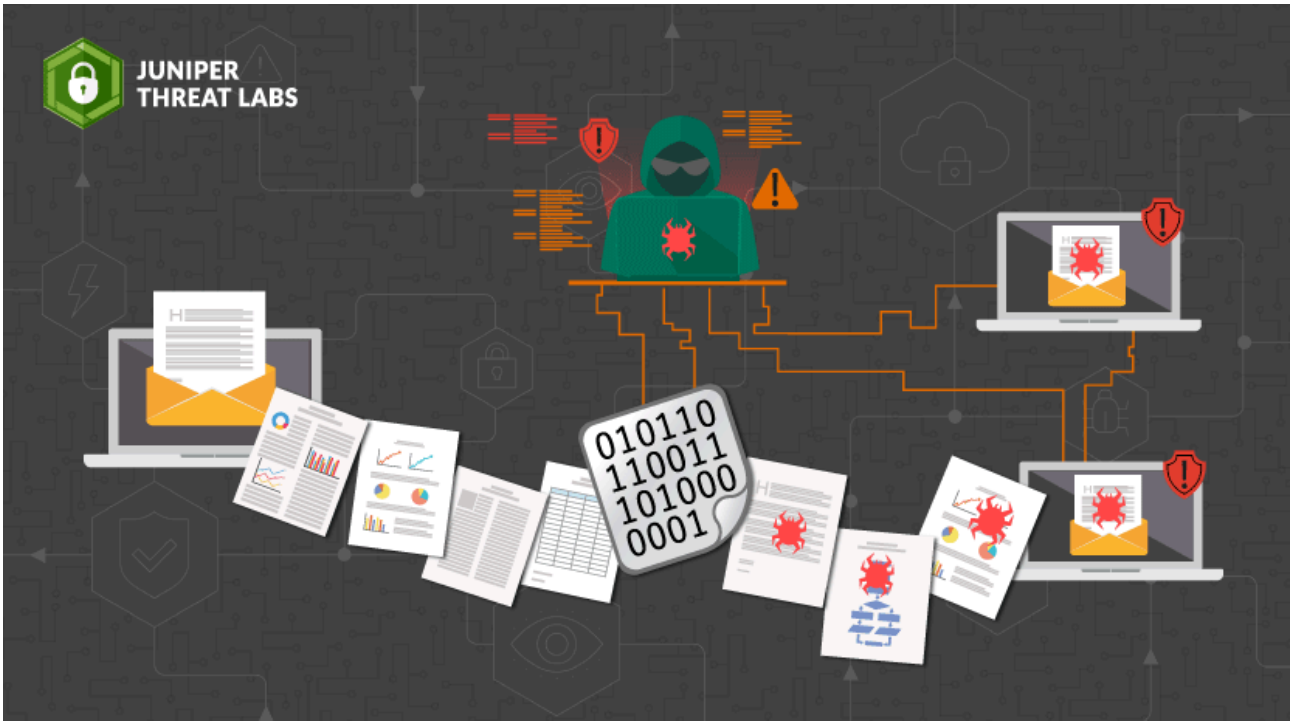
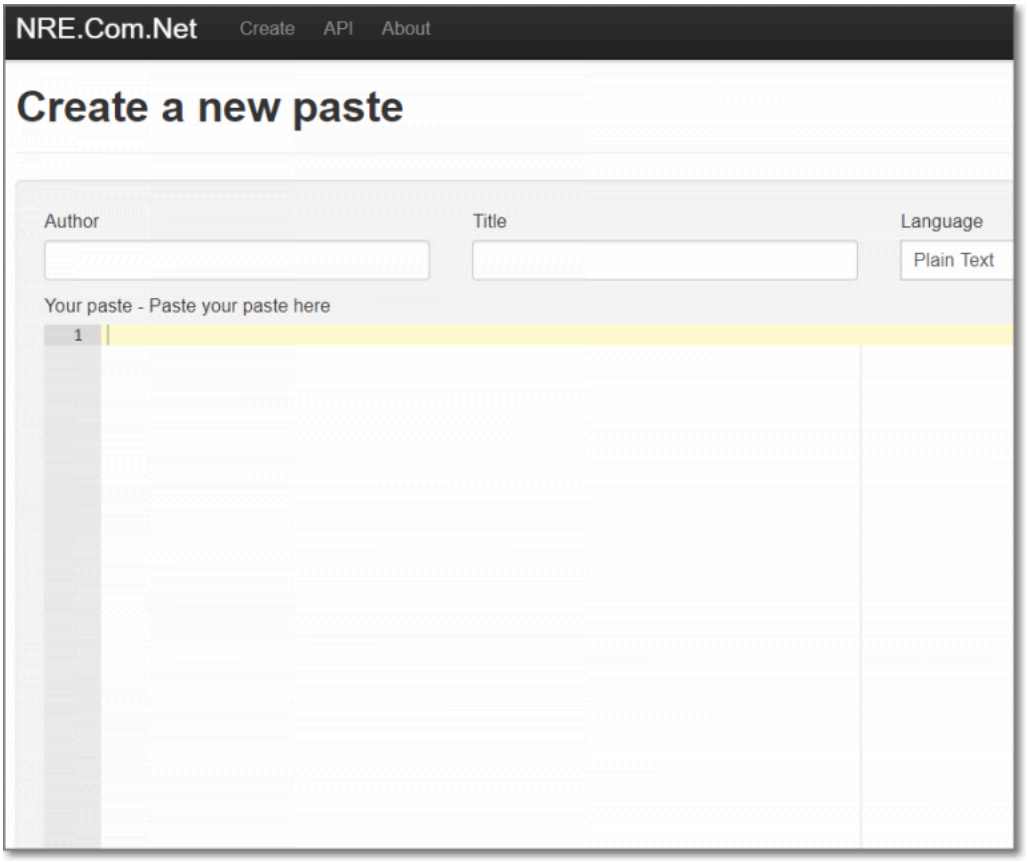


Juniper Threat Labs identified several malware campaigns that rely on a pastebin-like service for its infection chain. The domain in question is paste.nrecom.net. The attacks usually start as a phishing email and, when a user is tricked into executing the malware, it downloads the succeeding stage of the malware from paste.nrecom.net and loads it into the memory without writing to disk. Using a legitimate web-service for the malware infrastructure is not new, as we have seen APT group FIN6 using pastebin to host parts of the infection chain and Rocke using it for command and control. Although using legitimate web services is not novel, this is the first time that we have seen threat actors use paste.nrecom.net. Among the malware we have identified are AgentTesla, LimeRAT, Ransomware and Redline Stealer.

What is paste.nrecom.net?



Paste.nrecom has been in service since May 2014. If you are not familiar with pastebin, it is a service where you can post your code or text data with the intent of sharing it with others. Paste.nrecom does the same thing and it also offers an API that allows scripting. This is advantageous to threat actors as they can easily insert and update data programmatically. This service is powered by Stikked, which is an open-source PHP based pastebin.

How do threat actors use it for malicious purposes?

Because it is a text-only service, one would think that it cannot host an executable file (binary data) into it. However, binary data can be represented as a text file by simply encoding it. The common encoding method is using base64. That is exactly what the threat actors did in this case.

malicious paste encoded in base64

To add another layer of obfuscation, they encrypt the binary data with a XOR key. The following file, for example, is encrypted with XOR key, 0x02.

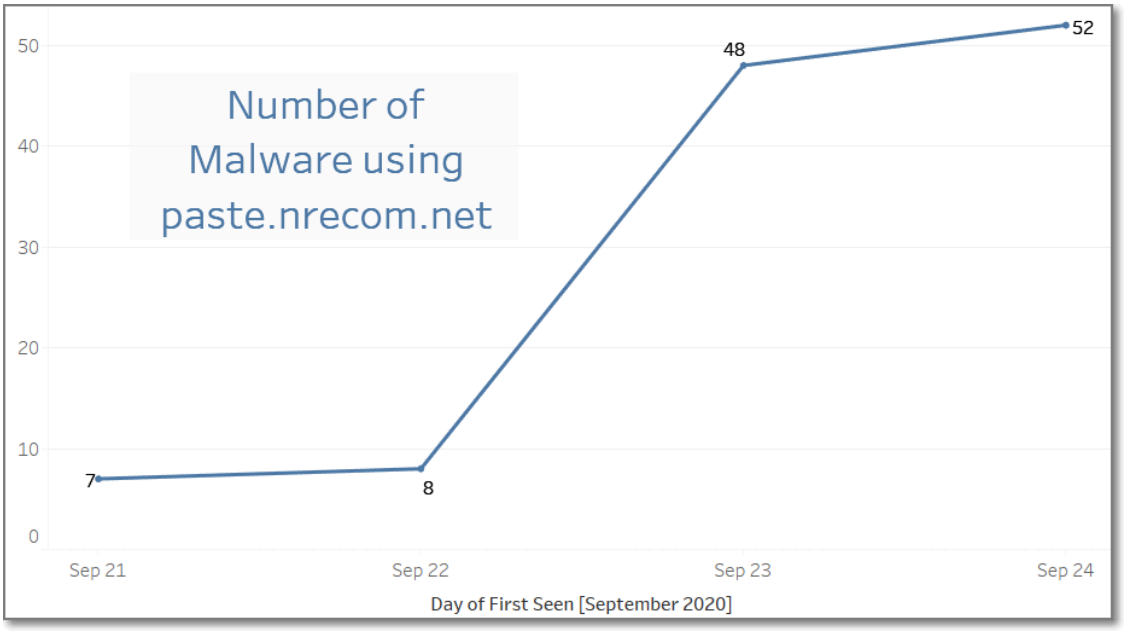
```
λ base64 -d 3529ec57 | xxd | head
00000000: 4f58 9202 0102 0202 0602 0202 fdfd 0202  OX..............
00000010: ba02 0202 0202 0202 4202 0202 0202 0202  ........B.......
00000020: 0202 0202 0202 0202 0202 0202 0202 0202  ................
00000030: 0202 0202 0202 0202 0202 0202 8202 0202  ................
00000040: 0c1d b80c 02b6 0bcf 23ba 034e cf23 566a  ........#..N.#Vj
00000050: 6b71 2272 706d 6570 636f 2261 636c 6c6d  kq"rpmepco"acllm
00000060: 7622 6067 2270 776c 226b 6c22 464d 5122  v"`g"pwl"kl"FMQ"
00000070: 6f6d 6667 2c0f 0f08 2602 0202 0202 0202  omfg,...&.......
00000080: 5247 0202 4e03 0102 dbcd 655d 0202 0202  RG..N.....e]....
00000090: 0202 0202 e202 2002 0903 5202 02f6 0502  ......  ...R.....
```

After base64 decoding, the file is still encrypted with XOR algorithm.

```
λ xxd 3529ec57.dec.XOR.02 | head
00000000: 4d5a 9000 0300 0000 0400 0000 ffff 0000  MZ..............
00000010: b800 0000 0000 0000 4000 0000 0000 0000  ........@.......
00000020: 0000 0000 0000 0000 0000 0000 0000 0000  ................
00000030: 0000 0000 0000 0000 0000 0000 8000 0000  ................
00000040: 0e1f ba0e 00b4 09cd 21b8 014c cd21 5468  ........!..L.!Th
00000050: 6973 2070 726f 6772 616d 2063 616e 6e6f  is program canno
00000060: 7420 6265 2072 756e 2069 6e20 444f 5320  t be run in DOS
00000070: 6d6f 6465 2e0d 0d0a 2400 0000 0000 0000  mode....$.......
00000080: 5045 0000 4c01 0300 d9cf 675f 0000 0000  PE..L.....g_....
00000090: 0000 0000 e000 2200 0b01 5000 00f4 0700  ......"...P.....
```

After all the necessary decoding and decryption, you will then see the executable file, as shown above.

From September 21, 2020, we have seen several malware families taking advantage of this service and quickly ramped up.



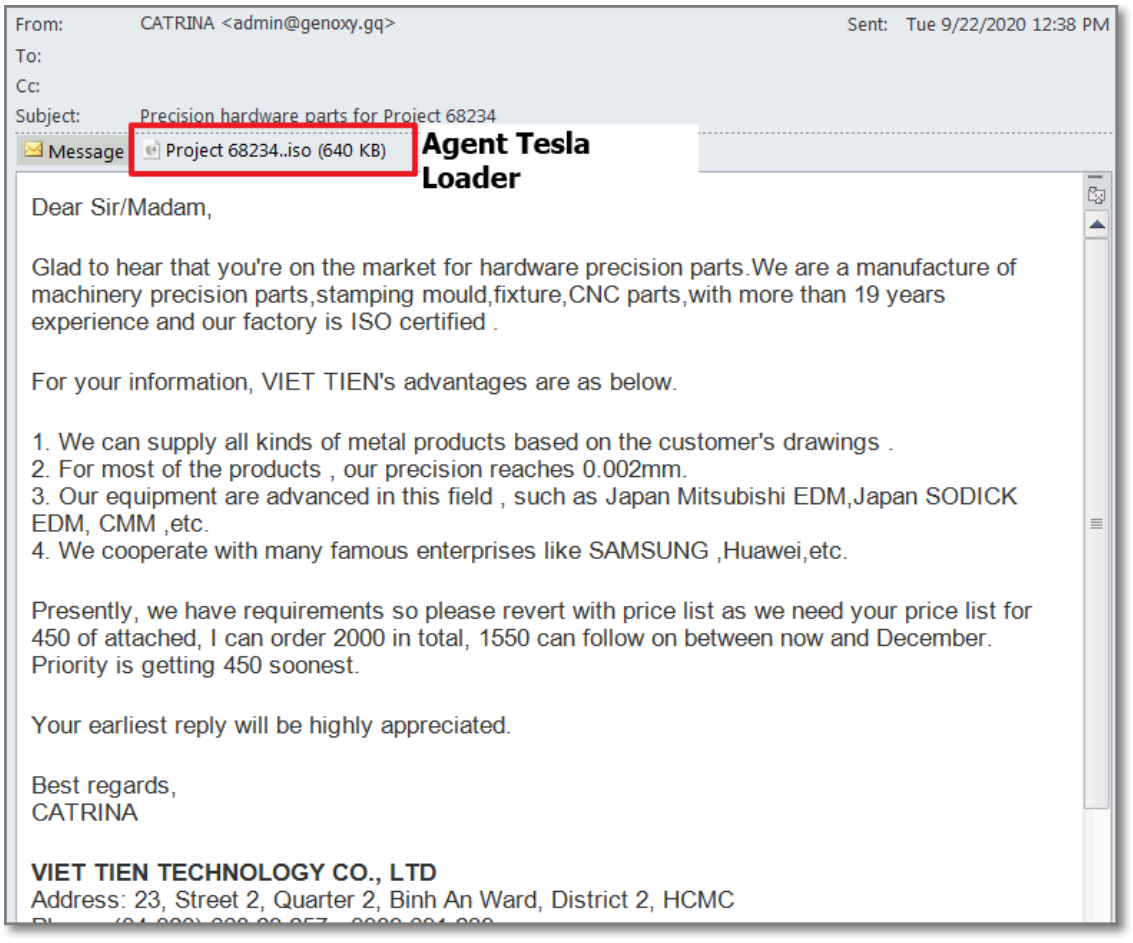
Malware Campaigns

The attack usually starts with a phishing email that includes an attachment, such as a document, archive or an executable. When a user is tricked into installing the malicious attachment (first stage), it downloads the next stages from paste.nrecom.net. We have also seen malware hosting their configuration data in the same service.

Agent Tesla

Agent Tesla is a spyware that is capable of stealing personal data from web browsers, mail clients and FTP servers. It can also collect screenshots, videos and capture clipboard data. Recent versions of this malware are also capable of stealing personal data from VPN clients. It is being sold on the underground markets for as low as $15 and could go up to $70 depending on the additional features.

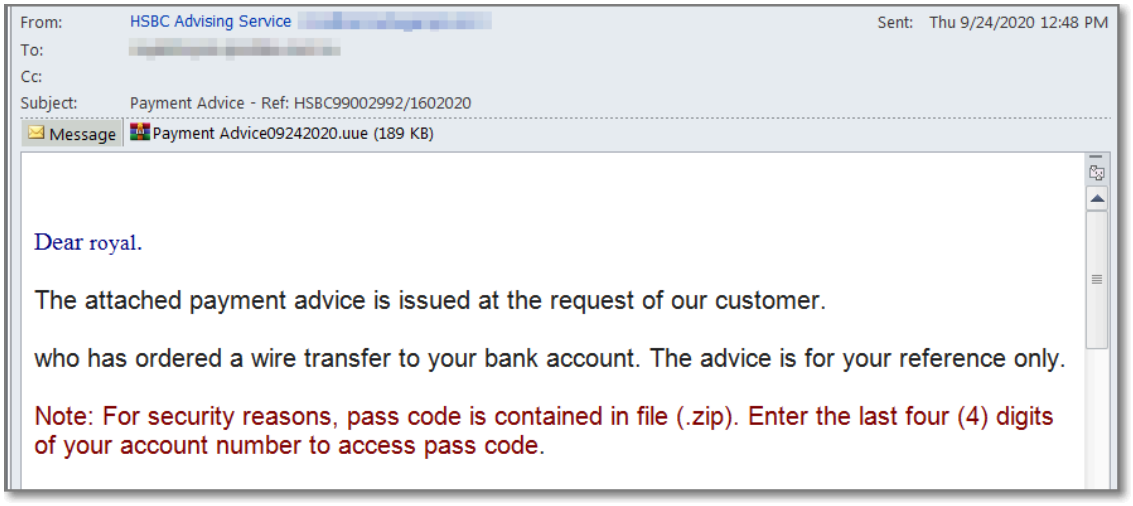
Agent Tesla is among the most active malware using this pastebin-like service. Campaigns usually start with a phishing email with a malicious attachment. Based on the samples we found, these campaigns target multiple industries related to shipping, supply chain and banks. In some cases, the attachments are archives, such as .iso, .rar or .uue like below:



Attachment Sha256: 9c38ab9d806417e89e3c035740421977f92a15c12f9fa776ac9665a1879e5f67

Infection Chain for 9c38ab9d806417e89e3c035740421977f92a15c12f9fa776ac9665a1879e5f67

As you can see from the chain, there are two requests to paste.nrecom because it divides the Agent Tesla payload into two. The first request is the first half of the file and the second request makes the second half. This technique makes it harder for security solutions to analyze the payload.



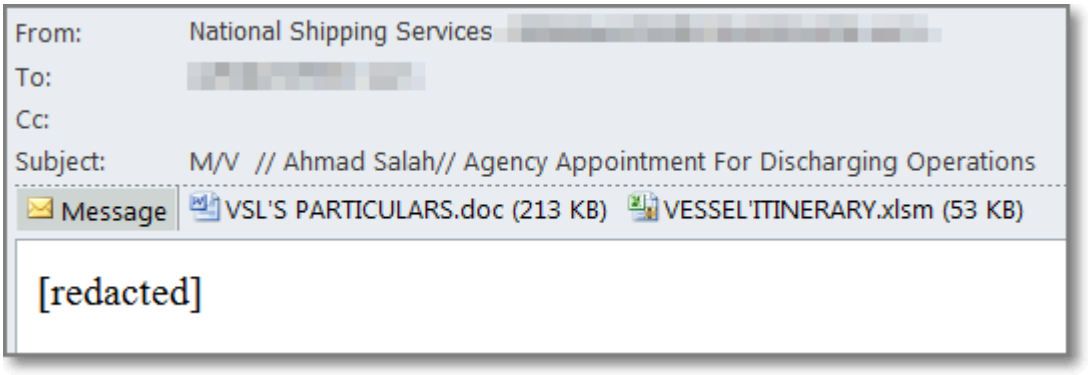
Another sample phishing email has the attachment with Sha256: 199a98adf78de6725b49ec1202ce5713eb97b00ae66669a6d42f8e4805a0fab9

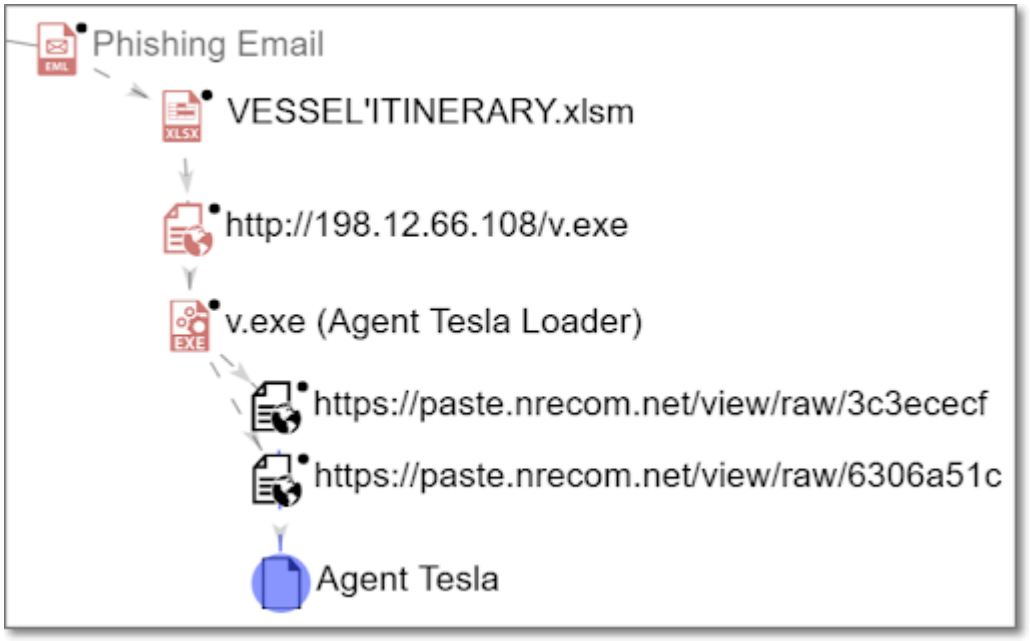
Below are email attachments and files inside some email attachments that we have found to install Agent Tesla using paste.nrecom.

File Name	Sha256
Emirate bank TT copy 2020-09-20 at 07.30.55.uue	f8c02c3f6d22978b3c478d0fb7ad4845609b8ad4a38e0ed2a75721156a6a8e44

Inv C-22464 PO 3871.exe	27f8e739b62c685c4115f49ae146bb75271d0b8fad021436939735bf7492186b
PO#150367285 SECONDO VERGANI SPA Ref#BK043383.exe	3101003430beae11fe082a07878ac2f643a64e3abd82b7b2a787a0e1fde27307
Payment Notification.uue	b7cf6fb7557f435bab1b815a38b1771aea9d118192f6d184111754615e8881af
bank payment copy.exe	136991b95c503e13d7ed77305a305f6f568c9d93273584d19a33014202a6ebbb
Payment docs63878288882788.docx.rar	44221603cb9e19a630e35bd12a9c8bd97a9d2743a6fc5528e81db0718fc3e1b3
Attachment JOIN LEADERS PO332,pdf.exe	167139073c586fd0d7de374611f899e170fd0316463be6c65170496636b3e42d
APROBACION DE TRANSFERENCIA INUSUAL REALIZADA EXITOSAMENTE.tar	0e044c8570122a280c963cac80e0140da78ee0d378cd17cab4ea6f146ce35d15

In some cases, the attached files are Office Documents that download the Agent Tesla loader.

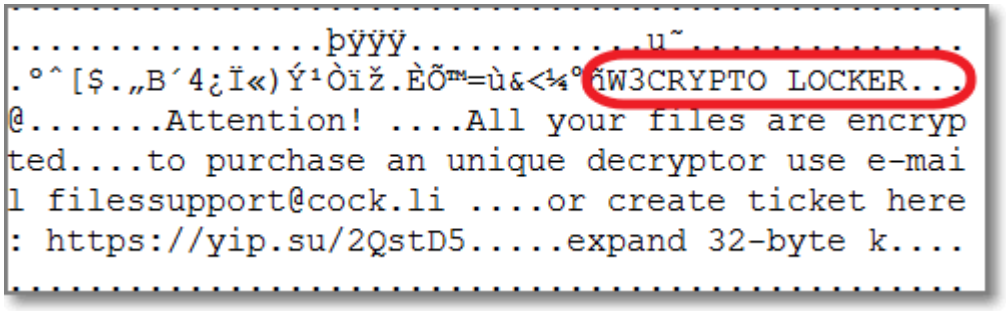




Infection chain for c66e6c6018d3e51e8b39146c6021fb51f59750b93778a063f7d591f24068c880

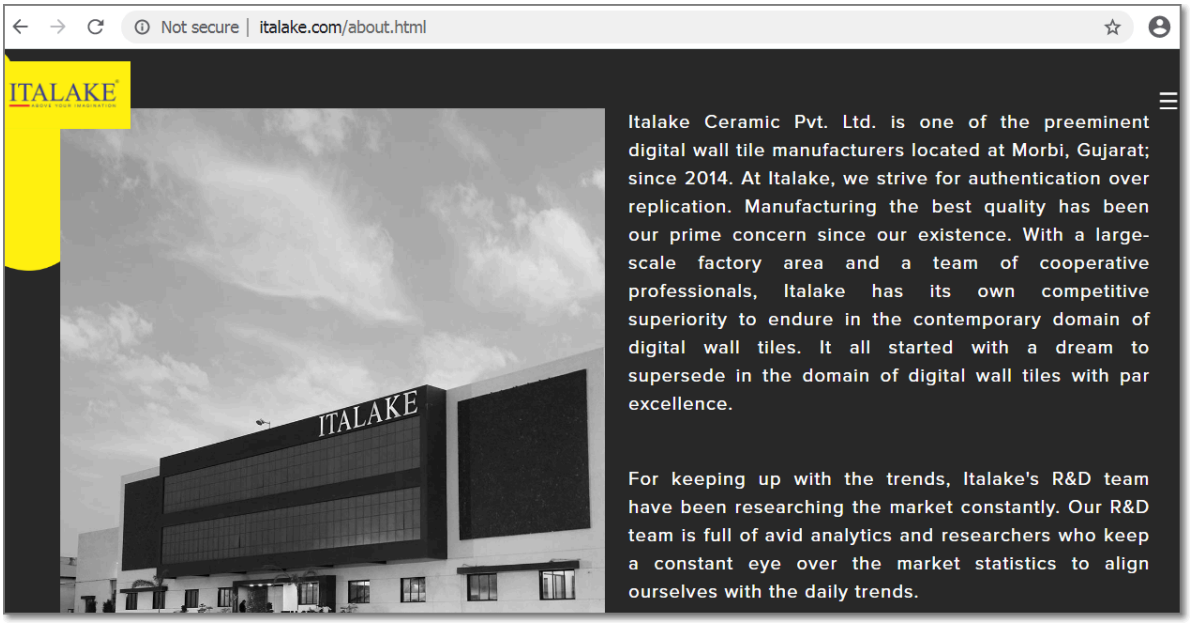
W3Cryptolocker Ransomware

W3Cryptolocker is a relatively new ransomware. Based on our telemetry, this ransomware surfaced in July 2020. We will call this malware W3Cryptolocker, based on a string found in its code.



Strings found in the binary code of this ransomware.

The loader was hosted on a potentially hacked site, italake.com.

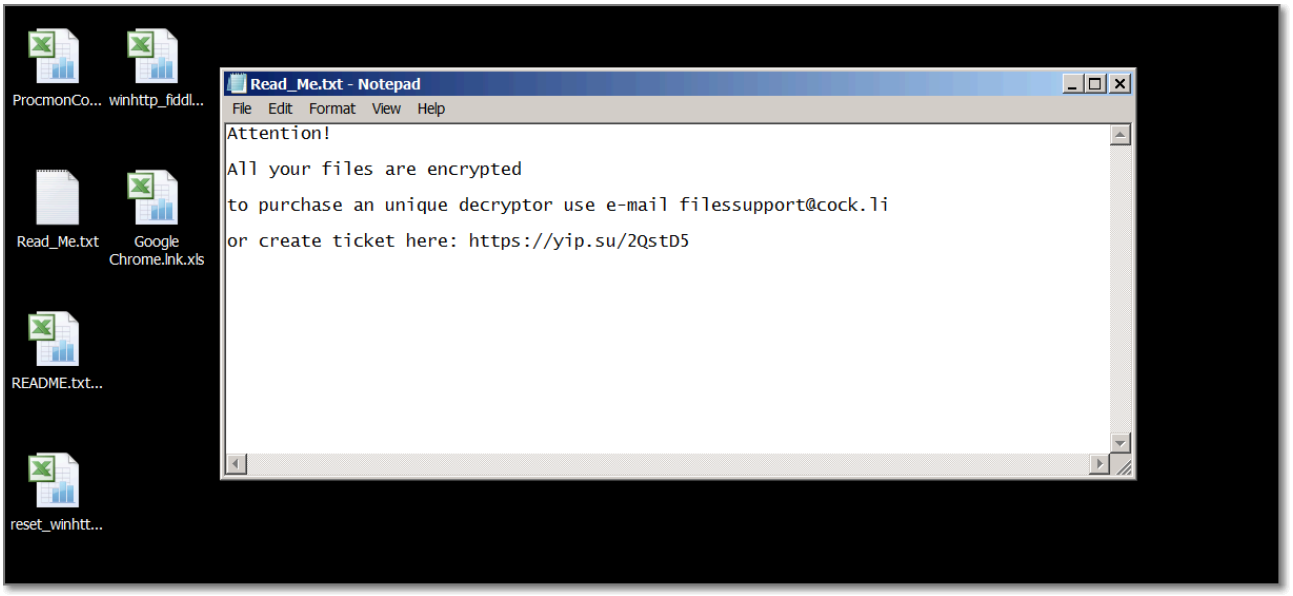


Infection Chain of Ede98ae4e8afea093eae3163888255276588074 89e5559bff6dbf5bc5b554a2c

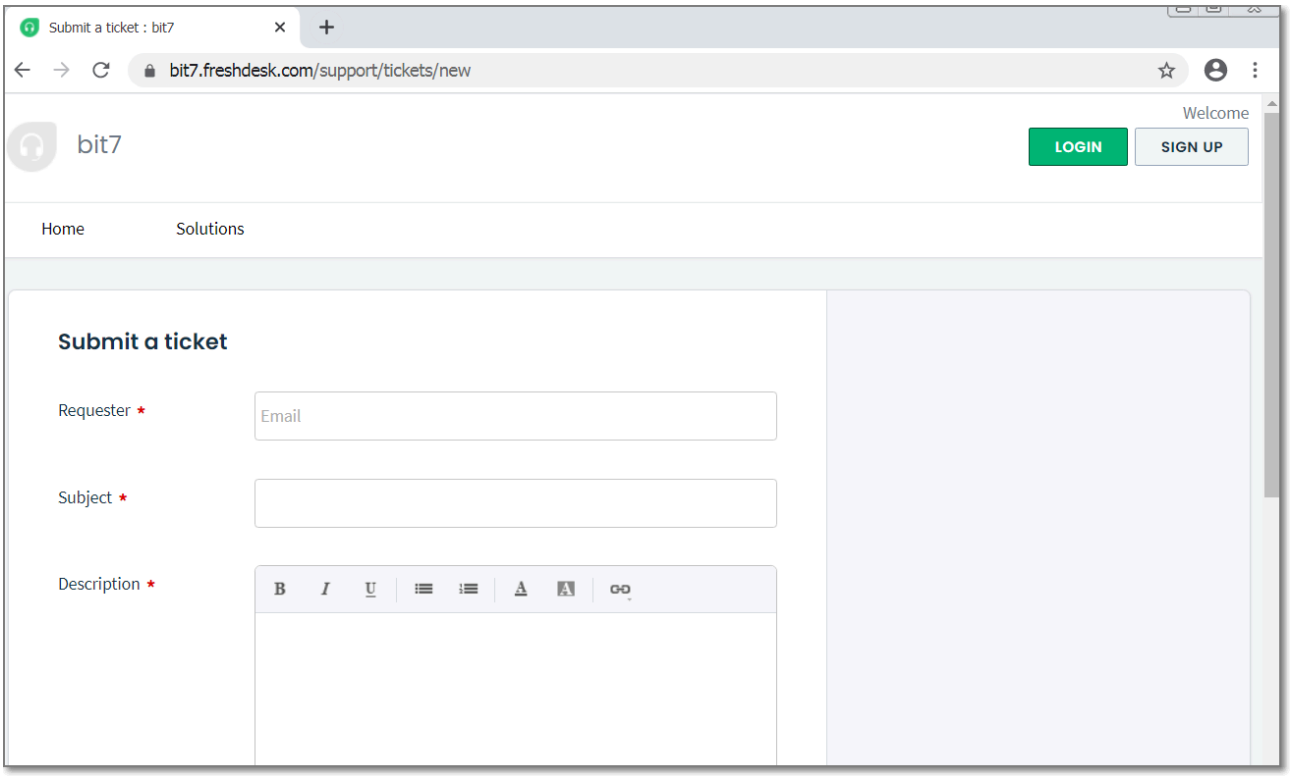
It will encrypt all files in all drives except for files having ".xls" extension and folders having the following strings:

- Windows
- ProgramData
- $Recycle.bin
- System Volume Information

It adds an extension .xls for encrypted files. After it is done encrypting each folder, it creates a "Read_Me.txt" file on each folder with the following message.



Visiting thehttps://yip[.]su/2QstD5 leads you to a freshdesk support site, bit7.freshdesk.com.



Other W3Cryptolocker Samples

- c97852b425e41d384227124d93baf6c2d3e30b52295a828b1eac41dc0df94d29
- 9a0af98d0b8f7eacc3fdd582bbc0d4199825e01eeb20c2a6f98023c33ece74f6
- 01eea2a4628c6b27a5249a08152655246871acafa657e391b73444c05097976e
- 9a08e87e8063b13546e464f73e87b2ca5bde9410fec4e614313e2b8a497592fa
- 8dfe87850bd17b4eb0169b85b75b5f104ae6b84deeb2c81fe6ae5e19685f6c66
- 53124033d521158771eac79ad6f489c6fdd5b25ab96712035c2ca65b3a3c5eed
- aac2024789ffd2bfce97d6a509136ecf7c43b18c2a83280b596e62d988cedb10

- fafabdffa67883587ba1a3c29f6345a378254f720efe8c2f318a4d5acdbce373

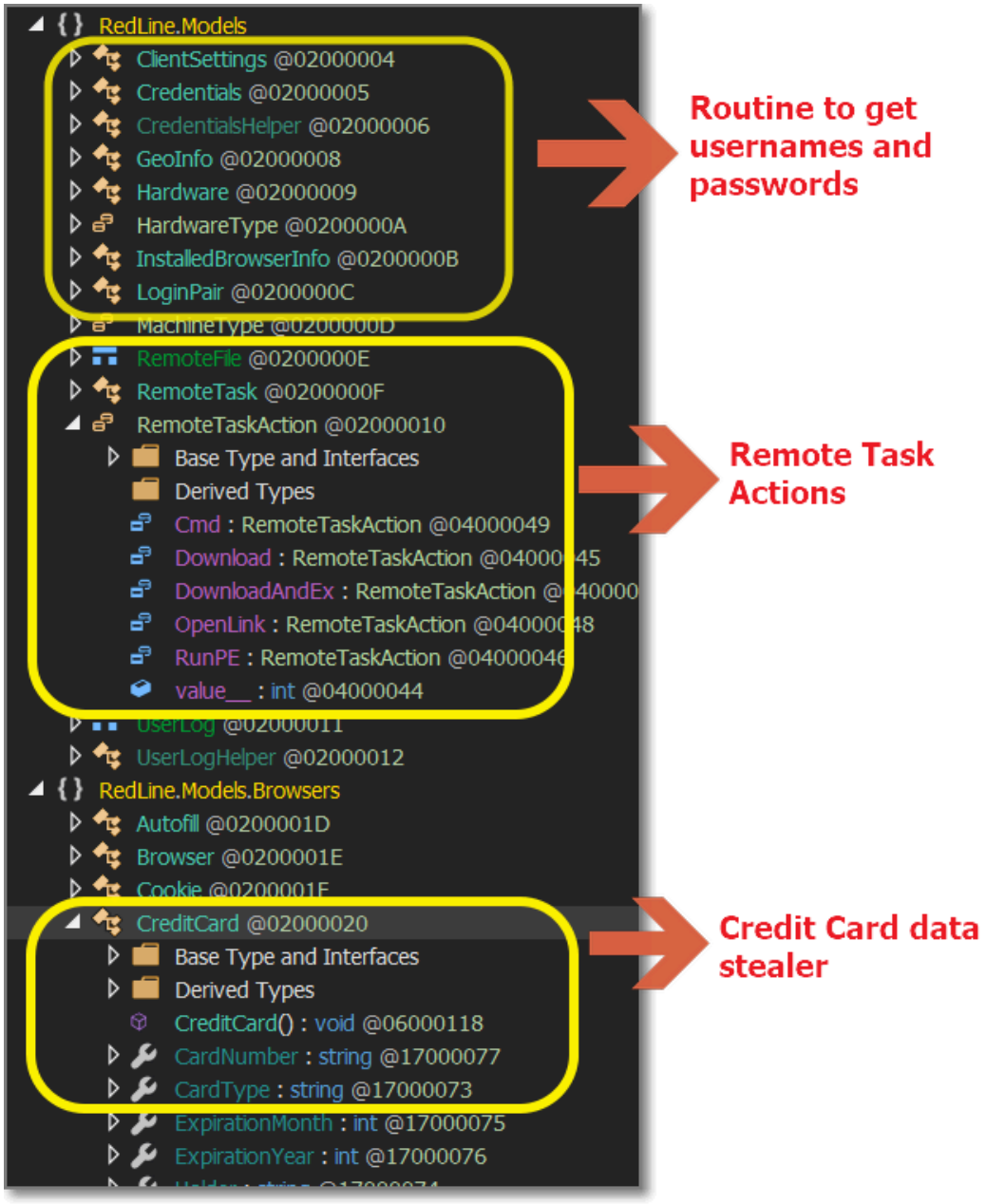
Redline Stealer

Redline Stealer is a malware that surfaced around March 2020 and it was reported to have targeted healthcare and manufacturing industries in the United States. This malware is found being advertised on forums with several pricing options starting from $100/month subscription. It has the following functionality:

- Browser Data Stealer
  - Login and Passwords
  - Cookies
  - Autocomplete Fields
  - Credit Cards
- Remote Task Functions
  - Execute Commands
  - Download Files
  - Download Files and Execute
  - RunPE (Process Injection for fileless infection)
  - OpenLink
- FTP and IM client stealer
- File-grabber
- Collects information about the victim’s system

The sample we found poses as a Bitcoin Miner archived into a RAR file. The archive contains an executable, MinerBitcoin.exe, that downloads the Redline Stealer payload from paste.nrecom.net.

Infection Chain of Redline Stealer: Sha256: a719affc96b41b63f78d03dc3bc6b7340287d25d876e58fd1ab307169a1751dc



Redline Stealer malicious functions

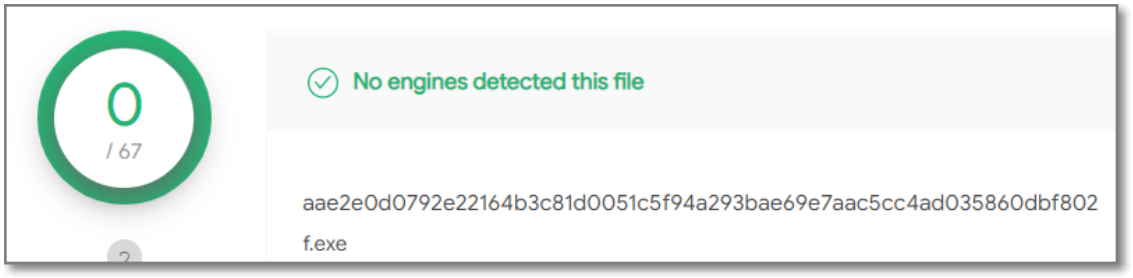
LimeRAT

LimeRAT is a remote administration trojan coded in .NET and is open source. It was a malware used to target Colombian government institutions by the APT-C-36 group. Among its many capabilities, it can be used as:

- Ransomware
- Remote Desktop
- Crypto Mining
- CryptoStealer
- DDOS
- Keylogger
- Password Stealer

Infection Chain of 20ad344d20337f8a782135e59bc1f6e1a7999bcddc50fc1dc3b8b6645abcb91e

Another sample we found is aae2e0d0792e22164b3c81d0051c5f94a293bae69e7aac5cc4ad035860dbf802. At the time of this analysis, this sample still has zero VT detections. It downloads the LimeRAT from https://paste[.]nrecom[.]net/view/raw/93a7cd20.

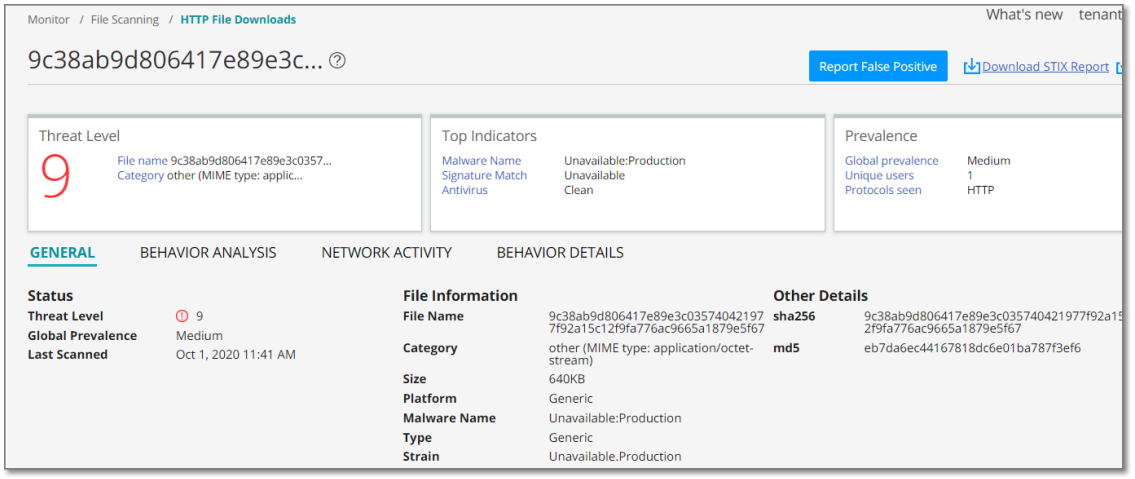


aae2e0d0792e22164b3c81d0051c5f94a293bae69e7aac5cc4ad035860dbf802 with no VT hits

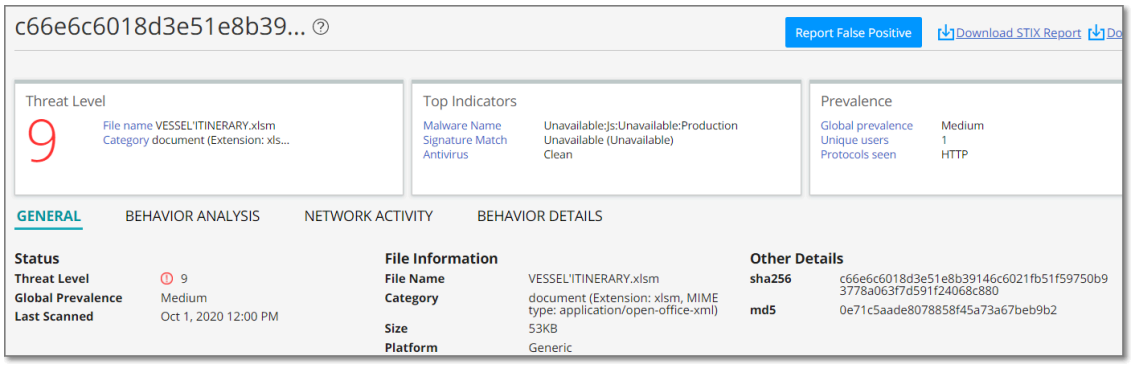
Conclusion

Using legitimate web-services like pastebin or paste.nrecom for malware infrastructure gives cybercriminals an advantage, as these services cannot be easily taken down due to their legitimate use. We recommend Security Operations to add paste.nrecom to potentially web services being abused for malicious purposes. It is recommended to monitor web-services like this one for suspicious content particularly binary data encoded in base64. Juniper's Encrypted Traffic Insights capability on the SRX NGFW does detect the malicious TLS connections to paste.nrecom.net as malicious using machine learning as seen in the screenshot below for W3Cryptolocker loader.

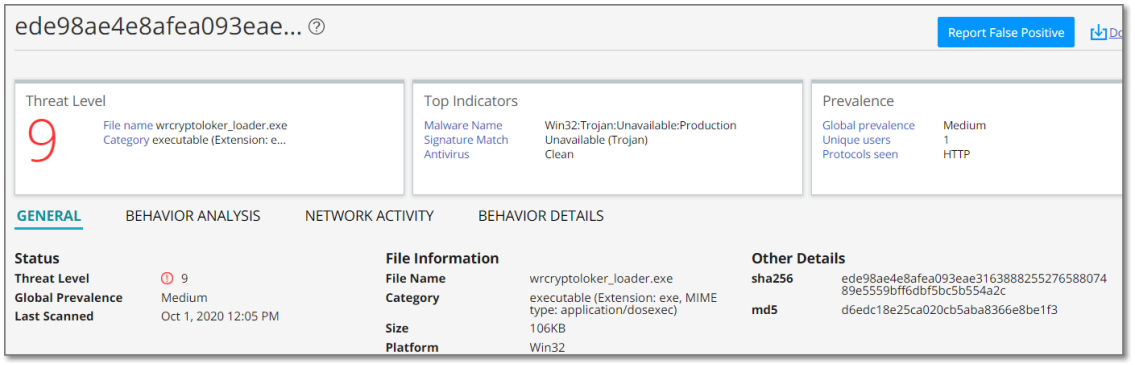
Juniper Advanced Threat Protection (ATP) detects these threats.



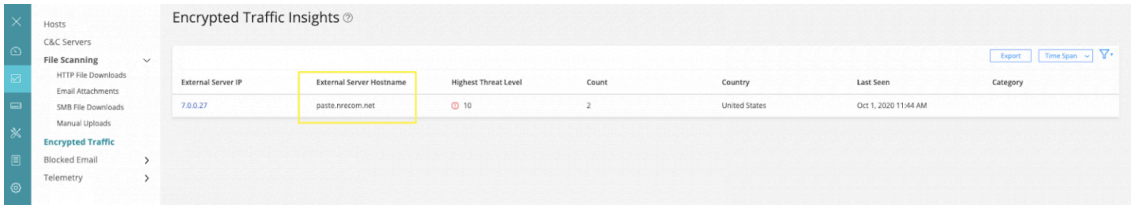
Detection of AgentTesla Loader (Project 68234.iso)



Detection of AgentTesla Loader (VESSL'ITENERARY.xlsm)



Detection of W3Cryptolocker Loader (0022.exe)



Detection of malicious connection to paste.nrecom using Juniper Encrypted Traffic Insights

Indicators of Compromise (IOC)

Domain

Paste.nrecom.net

192.12.66.108

lol.thezone.vip

URL

https://198[.]12[.]66[.]108/v[.]exe

https://lol[.]thezone[.]vip/v[.]exe

https://italake[.]com/assets/css/0022[.]exe

https://paste[.]nrecom[.]net/view/raw/3c3ececf

https://paste[.]nrecom[.]net/view/raw/6306a51c

https://paste[.]nrecom[.]net/view/raw/bfefa179

https://paste[.]nrecom[.]net/view/raw/39468747

https://paste[.]nrecom[.]net/view/raw/c230a816

https://paste[.]nrecom[.]net/view/raw/3529ec57

https://paste[.]nrecom[.]net/view/raw/7900ed08

https://paste[.]nrecom[.]net/view/raw/bd63e76f

https://paste[.]nrecom[.]net/view/raw/658b9281

https://paste[.]nrecom[.]net/view/raw/b44fe71a

https://paste[.]nrecom[.]net/view/raw/93a7cd20

https://paste[.]nrecom[.]net/view/raw/d8aedaf6

https://paste[.]nrecom[.]net/view/raw/91aec4e7

https://paste[.]nrecom[.]net/view/raw/4736837b

https://paste[.]nrecom[.]net/view/raw/aec14685

https://paste[.]nrecom[.]net/view/raw/c7dfc858

https://paste[.]nrecom[.]net/view/raw/bebcab0a

https://paste[.]nrecom[.]net/view/raw/bfbb1544

https://paste[.]nrecom[.]net/view/raw/7f41da66

https://paste[.]nrecom[.]net/view/raw/0d9233c8

https://paste[.]nrecom[.]net/view/raw/4f789f73

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https://paste[.]nrecom[.]net/view/raw/3066146f

https://paste[.]nrecom[.]net/view/raw/019f27dd

https://paste[.]nrecom[.]net/view/raw/04fba6cb

Sha256

9c38ab9d806417e89e3c035740421977f92a15c12f9fa776ac9665a1879e5f67

Ede98ae4e8afea093eae3163888255276588074 89e5559bff6dbf5bc5b554a2c

cb1da05bac46d1aeb0eeec67b2249aa8f539784c4a9ff9245b4ed4a8937ccd0f

337f28a9250592d0ebc58f5a913114df82e69ef4c44243191204adfa61f9819b

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bc2e03ca292da305602c8755453fa87073810a6359f2ec9a0935fe3bb51ef886

4f31265917db7d9abbdf4b6378da0822158cc9b4bff1904adad63a87cfa82f2e

3d3ab28f09d5736fcd2215fb6395e7b15e6e9f1f86931b1d3d956c70879e9d33

13b630c5c157585f6abcb2fc8e3388c23a09f881c20cdeaffda291fb36a37539

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1089bd2bc482573fc05dbea6a3c195802accedcd9ad74c6e4125a7a035c021be

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