Yashma Ransomware, Tracing the Chaos Family Tree

The BlackBerry Research & Intelligence Team ⋮⋮ 5/24/2022

It's not often that we get to observe the behind-the-scenes drama that can accompany the creation of new malware, but when we do, it gives us a fascinating glimpse into how threat actors operate. One such glimpse, stemming from an online exchange between a ransomware perpetrator and a victim, gave us new insights into the origins of Chaos malware, revealing a twisted family tree that links it to both Onyx and Yashma ransomware variants.

The clues surfaced during a discussion between a recent victim and the threat group behind Onyx ransomware, taking place on the threat actor's leak site. Someone claiming to be the creator of the Chaos ransomware builder's kit joined the conversation, and revealed that Onyx was constructed from the author's own Chaos v4.0 Ransomware Builder. The author went on to promote the most current version of the Chaos ransomware line, now renamed "Yashma."

The Chaos author's apparent intent of "outing" Onyx as a copycat is particularly ironic, given the origins of Chaos; that threat's first incarnation sought to steal thunder from Ryuk ransomware by touting itself as a .NET version of Ryuk, complete with Ryuk branding on its graphical user interface (GUI). But the response to this ham-handed tactic was so negative, it prompted the threat's creator to drop the Ryuk pretense and quickly rebrand its new creation as "Chaos."

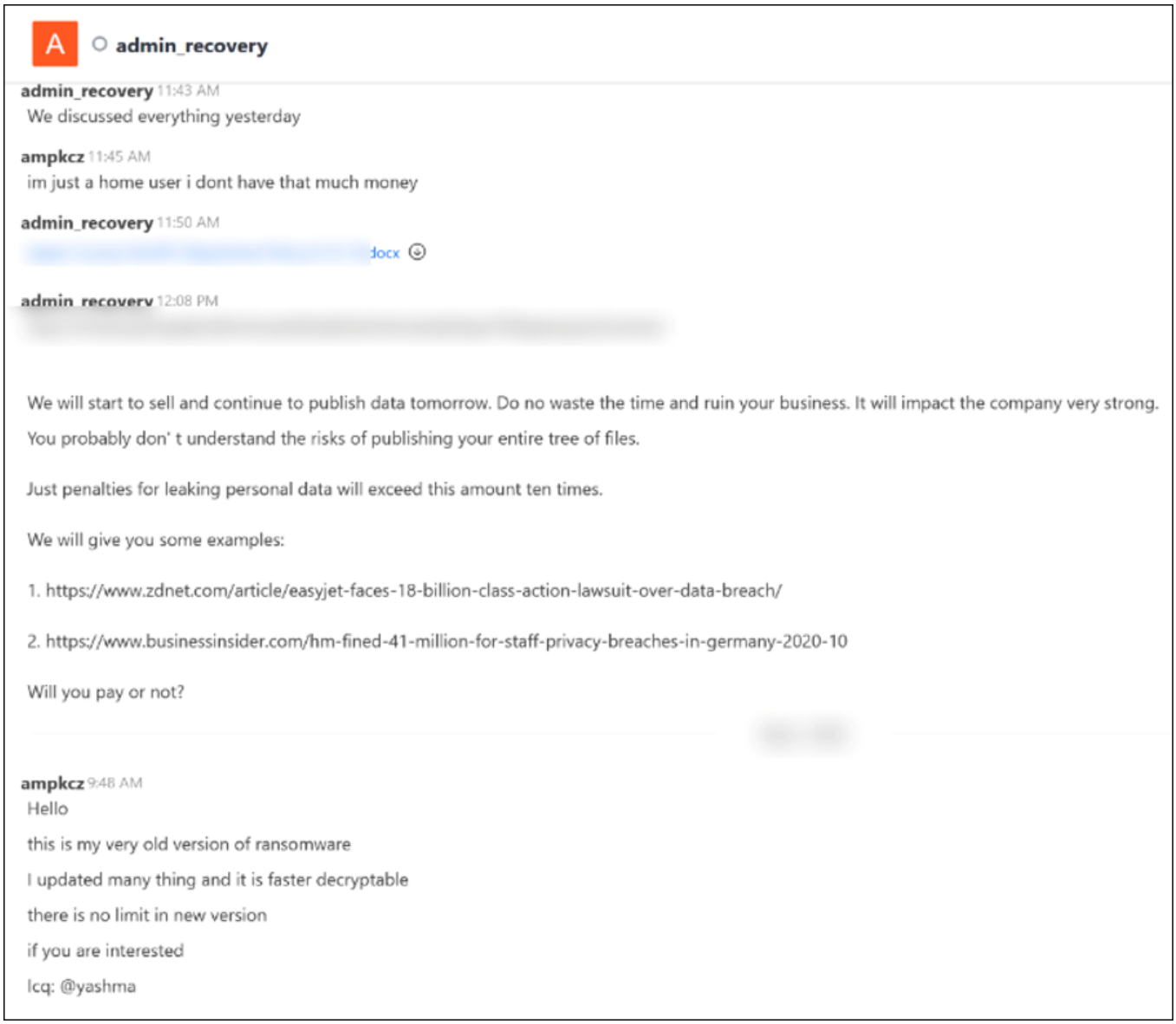


Figure 1: Screen capture of the chat on the Onxy ransomware leak site, showing comments by a person claiming to be the creator of Chaos malware

Operating System

Windows	MacOS	Linux	Android
Yes	No	No	No

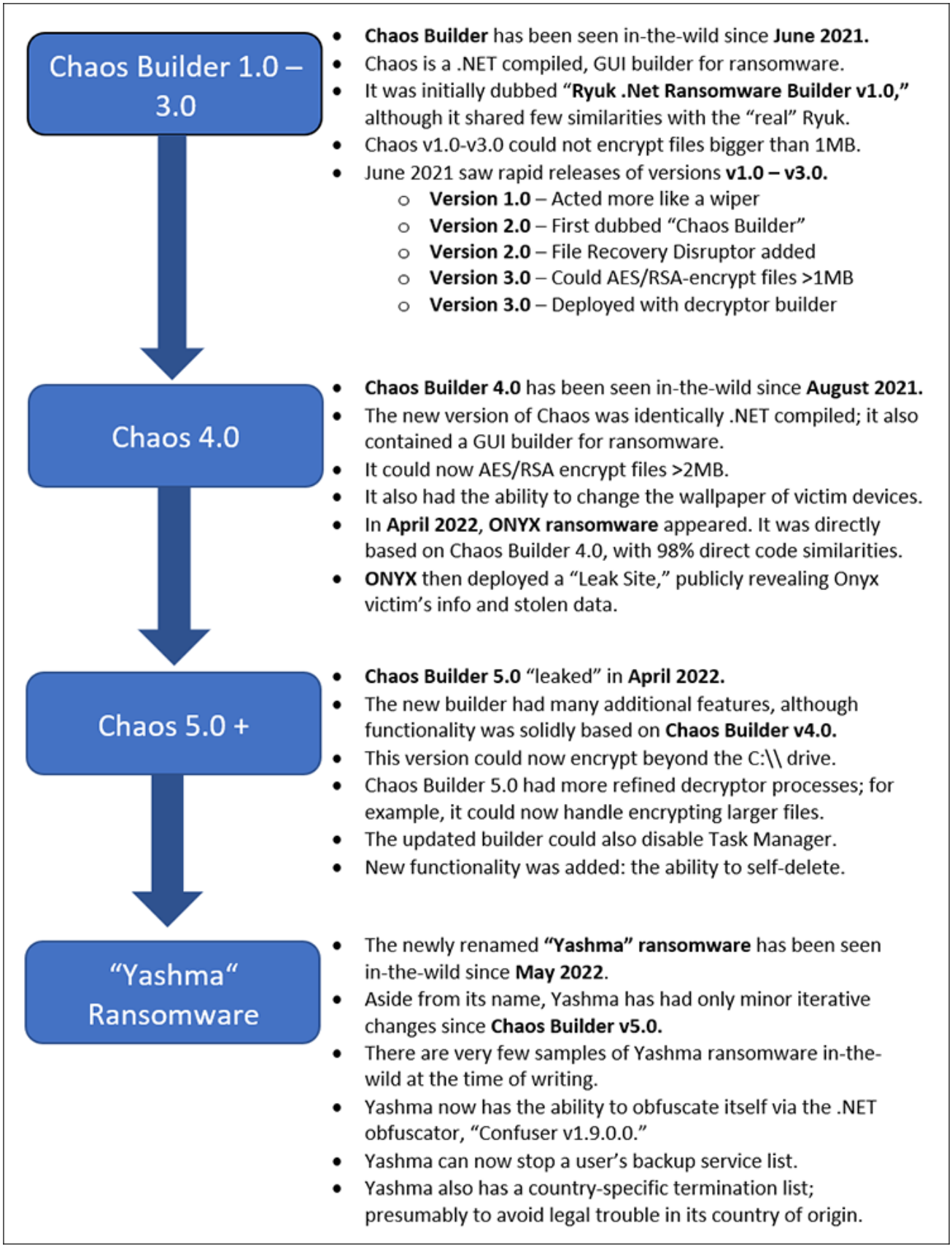
Risk & Impact

Impact	High
Risk	Medium

Technical Analysis

Though Chaos ransomware builder has only been in the wild for a year, Yashma claims to be the sixth version (v6.0) of this malware. The BlackBerry Research & Intelligence team has observed a lateral progression throughout each iteration, from its first – dubbed "Ryuk .NET Builder" (Chaos v1.0) – to its latest, "Yashma Ransomware Builder" (Chaos v6.0).

The diagram in Figure 2 below provides a timeline of the malware builder's development over the last twelve months, highlighting characteristics and advances the malware has made in this short time span.



- **Chaos Builder** has been seen in-the-wild since **June 2021.**
- Chaos is a .NET compiled, GUI builder for ransomware.
- It was initially dubbed "**Ryuk .Net Ransomware Builder v1.0,"** although it shared few similarities with the "real" Ryuk.
- Chaos v1.0-v3.0 could not encrypt files bigger than 1MB.
- June 2021 saw rapid releases of versions **v1.0 – v3.0.**
  - **Version 1.0** – Acted more like a wiper
  - **Version 2.0** – First dubbed "Chaos Builder"
  - **Version 2.0** – File Recovery Disruptor added
  - **Version 3.0** – Could AES/RSA-encrypt files >1MB
  - **Version 3.0** – Deployed with decryptor builder

- **Chaos Builder 4.0** has been seen in-the-wild since **August 2021.**
- The new version of Chaos was identically .NET compiled; it also contained a GUI builder for ransomware.
- It could now AES/RSA encrypt files >2MB.
- It also had the ability to change the wallpaper of victim devices.
- In **April 2022**, **ONYX ransomware** appeared. It was directly based on Chaos Builder 4.0, with 98% direct code similarities.
- **ONYX** then deployed a "Leak Site," publicly revealing Onyx victim's info and stolen data.

- **Chaos Builder 5.0** "leaked" in **April 2022.**
- The new builder had many additional features, although functionality was solidly based on **Chaos Builder v4.0.**
- This version could now encrypt beyond the C:\\ drive.
- Chaos Builder 5.0 had more refined decryptor processes; for example, it could now handle encrypting larger files.
- The updated builder could also disable Task Manager.
- New functionality was added: the ability to self-delete.

- The newly renamed **"Yashma" ransomware** has been seen in-the-wild since **May 2022**.
- Aside from its name, Yashma has had only minor iterative changes since **Chaos Builder v5.0.**
- There are very few samples of Yashma ransomware in-the-wild at the time of writing.
- Yashma now has the ability to obfuscate itself via the .NET obfuscator, "Confuser v1.9.0.0."
- Yashma can now stop a user's backup service list.
- Yashma also has a country-specific termination list; presumably to avoid legal trouble in its country of origin.

Figure 2: Timeline of Chaos/ Yashma malware

Chaos v1.0

The first version of Chaos ransomware was initially dubbed "**Ryuk .Net Ransomware Builder v1.0**." This threat was promoted on dark web forums as early as June 2021, claiming to be a .NET-compiled builder for the infamous ransomware family **Ryuk**, as seen in Figure 3.

The file was a basic .NET console that allowed malware operators to generate a sample of the threat that would go on to be known as **Chaos ransomware**. It also provided them with the ability to create a customized ransom note.

Figure 3: Ryuk .NET (Chaos) Ransomware Builder v1.0 panel

By claiming to be Ryuk, the dark web promotion of this builder sparked much analysis and research activity by the wider cybersecurity and reverse-engineering communities. However, no concrete links were found with the real Ryuk ransomware, or with the Wizard Spider group that created the infamous threat. It appears likely that the author was a "pretender to the throne," attempting to cash in on the ransomware's notoriety by piggybacking off the Ryuk name.

While this attempt to ride Ryuk's coat tails did generate a lot of attention for the builder, it was resoundingly negative. Users of many dark web forums called out the creator for this deceptive naming. Some of this negative publicity must have stuck with the author, as within a few weeks, the builder was rebranded as Chaos, and quickly followed by the release of Chaos V2.0 and Chaos V3.0.

The new malware generated by this initial "ransomware builder" was quite basic, and it lacked a lot of functionality expected from a typical piece of ransomware. As a result, this threat unintentionally performed more like a destructor or wiper.

Malware generated within the builder could perform the following simple functions:

- Randomize the file-extension of affected files (**default**: [a-z A-Z 0-9]{4})
- Copy itself to a given process name (default: svchost.exe) in ***%AppData%***
- Create a .LNK file in the victim's Startup folder

- Add RegKey to the following location:
  - SOFTWARE\\Microsoft\\Windows\\CurrentVersion\Run
  - **Key:** Microsoft Store
  - **Value:** %Current Path/Location%
- Attempt to spread itself via any connected USB drive.
- Perform a sleep function/delay feature.

The malware would only target the victim's C:\ drive, looking for files located in the following folders:

- Desktop
- Contacts
- Downloads
- Music
- Links
- Documents
- Pictures
- One Drive
- Saved Games
- Favorites
- Searches
- Videos

Although otherwise basic, Chaos-spawned malware had over a hundred targeted file-extensions that it would attempt to encrypt. Additionally, the malware had a list of files it would avoid targeting, including .DLL, .EXE, .LNK and .INI. These exclusions were likely there to prevent crashing the victim's device by encrypting necessary system files.

This initial edition of Chaos overwrites the targeted file with a randomized Base64 string, rather than truly encrypting the file. Because the original contents of the files are lost during this process (seen in Figure 4), recovery is not possible, thus making Chaos a wiper rather than true ransomware.

This is unlike the real Ryuk's encryption process, which uses AES/RSA-256 encryption.

```
public static string Base64Encode(string plainText)
{
    byte[] bytes = Encoding.UTF8.GetBytes(plainText);
    return string.Concat(new string[]
    {
        "<EncyptedKey>",
        Program.RandomString(31),
        "<EncyptedKey> ",
        Program.RandomString(2),
        Convert.ToBase64String(bytes)
    });
}

// Token: 0x06000008 RID: 8 RVA: 0x000022D0 File Offset: 0x000004D0
private static void encryptDirectory(string location)
{
    try
    {
        string[] files = Directory.GetFiles(location);
        bool flag = true;
        for (int i = 0; i < files.Length; i++)
        {
            try
            {
                string extension = Path.GetExtension(files[i]);
                string fileName = Path.GetFileName(files[i]);
                if (Array.Exists<string>(Program.validExtensions, (string E) => E == extension.ToLower()) && fileName != "read_it.txt")
                {
                    FileInfo fileInfo = new FileInfo(files[i]);
                    if (fileInfo.Length < 1098576L)
                    {
                        string @string = Encoding.UTF8.GetString(Program.random_bytes(Convert.ToInt32(fileInfo.Length) / 3));
                        File.WriteAllText(files[i], Program.Base64Encode(@string));
                        File.Move(files[i], files[i] + "." + Program.RandomStringForExtension(4));
                    }
                    else
                    {
                        string string2 = Encoding.UTF8.GetString(Program.random_bytes(Convert.ToInt32(fileInfo.Length) / 3));
                        File.WriteAllText(files[i], Program.Base64Encode(string2));
                        File.Move(files[i], files[i] + "." + Program.RandomStringForExtension(4));
                    }
                    if (flag)
                    {
                        flag = false;
                        File.WriteAllLines(location + "/read_it.txt", Program.messages);
                    }
```

Figure 4: Chaos v1.0/Ryuk .NET Builder encryption routine

In each folder affected by Chaos, the malware drops the ransom note as “read_it.txt.” This option is highly customizable within all iterations of the builder, giving malware operators the ability to include any text they want as the ransom note. In all versions of Chaos Ransomware Builder, the default note stays relatively unchanged, and it includes references to the Bitcoin wallet of the apparent creator of this threat.

Chaos v2.0 – v3.0

After the rebrand of Chaos malware took place, the second version of the malware was more refined than its initial iteration. This version included more advanced options, which one expects to see in more developed threats, as seen in Figure 5. It also (deceptively) continues to call itself ransomware, although the actual functionality remained that of a file-wiper.

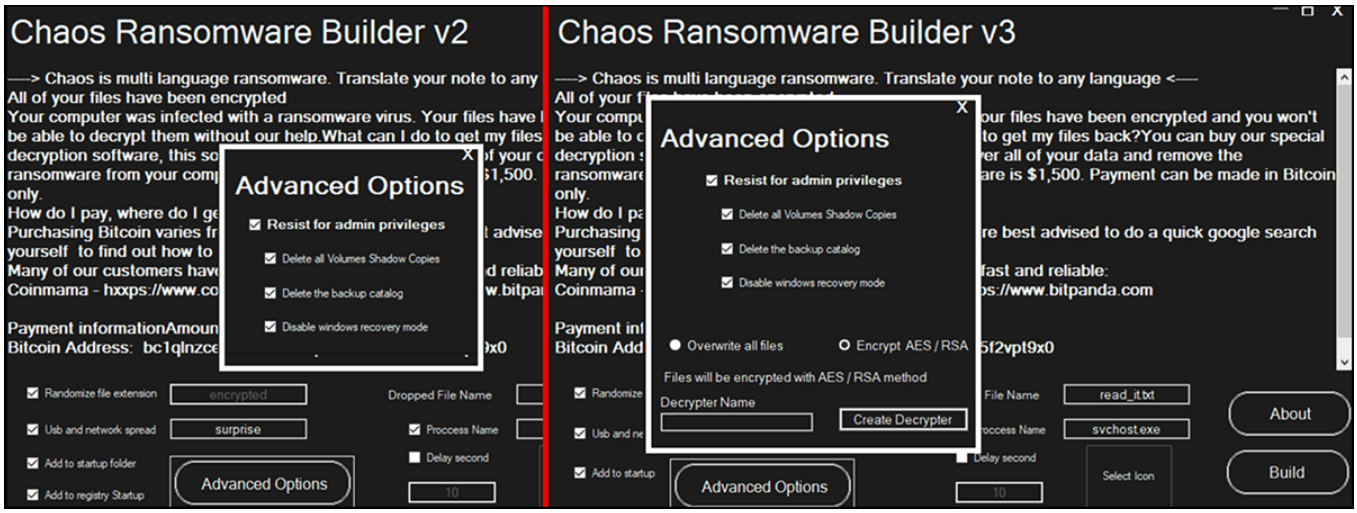


Figure 5: Builders for Chaos v2.0 and Chaos v3.0

The second iteration of Chaos had additional functionality, generating more advanced ransomware samples that could perform the following activities:

- Delete shadow copies
- Delete backup catalogs
- Disable Windows recovery mode

```
private static void deleteShadowCopies()
{
    Program.runCommand("vssadmin delete shadows /all /quiet & wmic shadowcopy delete");
}
```

```
private static void deleteBackupCatalog()
{
    Program.runCommand("wbadmin delete catalog -quiet");
}
```

```
private static void disableRecoveryMode()
{
    Program.runCommand("bcdedit /set {default} bootstatuspolicy ignoreallfailures & bcdedit /set {default}
      recoveryenabled no");
}
```

Figure 6: Chaos v2.0 file recovery disruption

Though Chaos v2.0 added these abilities to disrupt file recovery systems, the threat was still built on top of Chaos v1.0/Ryuk .NET Builder. This left its core encryption functionality unchanged, using the same encryption routine, as shown in Figure 4.

This means the malware was effectively still a destructor rather than actual ransomware, and there could be no attempt on the operator’s part to provide file recovery for a victim, even if the ransom was paid. Ironically, the author of Chaos v2.0 even mentions this in the “About” section of the builder, as shown below in Figure 7. In fact, the author

points out the lack of functionality, citing the malware's subsequent speed of operation as a selling point. (It is perhaps not surprising to note that the process of destroying files is twice as fast as it is to encrypt them.)

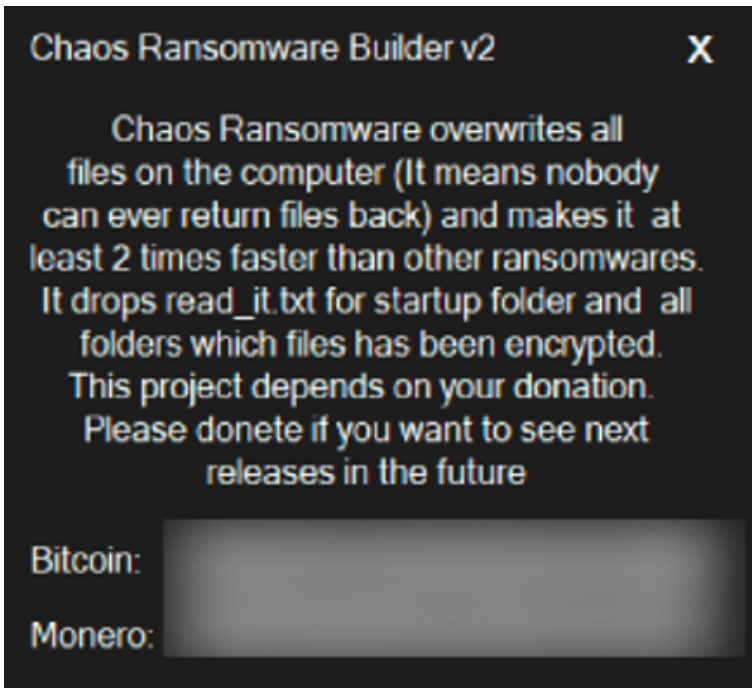


Figure 7: Chaos Builder v2.0 "About" section

Less than a month later, Chaos v3.0 was released, which finally had the ability to encrypt files. This meant the author could also create a decryptor to recover affected files.

Though this behavior was now more in line with the actions of traditional ransomware, the Chaos v3.0 builder could still only handle the encryption of files smaller than 1MB. This meant that it was still acting as a destructor for large files (such as photos or videos) on the unfortunate victim's system.

When a file is encrypted by this newer version of Chaos, it appends an "Encryption Key" to the beginning of every encrypted file, as shown in Figure 8. This key is generated when the ransomware is created.

	0001	0203	0405	0607	0809	0A0B	0C0D	0E0F	1011	1213	1415	1617	1819	1A1B	1C1D	1E1F	2021	0123456789ABCDEF0123456789ABCDEF01
0x000000	3C45	6E63	7970	7465	644B	6579	3E61	474E	7362	6D4E	685A	6D49	3065	5845	3564	446C	345A	<EncyptedKey>aGNsbmNhZmI0eXE5dD14Z
0x000022	586B	7A64	6E6F	3562	5756	6D4E	6D77	7765	5867	334F	576C	7164	4730	3564	586F	344D	6E4D	XkzdnO5bWVmNmwweXg3OWlqdG05dXo4MnM
0x000044	3D3C	456E	6379	7074	6564	4B65	793E	2063	6F56	752B	2F76	5372	7676	3733	7676	3733	7676	=<EncyptedKey> coVu+/vSrvv73vv73vv
0x000066	3733	4873	2B2B	2F76	576C	3847	4F2B	2F76	652B	2F76	652B	2F76	5248	7676	3733	7676	3731	73Hs++/vW18GO+/ve+/ve+/vRHvv73vv71
0x000088	5A37	372B	397A	4C45	5742	3346	3737	372B	3954	752B	2F76	652B	2F76	5578	3937	372B	3956	Z77+9zLEWB3F777+9Tu+/ve+/vUx977+9V
0x0000AA	4E65	3057	4F2B	2F76	5276	7676	3733	7676	3731	5958	6A4E	6F37	372B	3962	4F2B	2F76	652B	Ne0WO+/vRvvv73vv71YXjNo77+9bO+/ve+
0x0000CC	2F76	652B	2F76	5458	7676	3731	5937	372B	3965	652B	2F76	534A	4C37	372B	3937	372B	3937	/ve+/vTXvv71Y77+9ee+/vSJL77+977+97
0x0000EE	372B	3937	372B	3958	752B	2F76	526F	4537	372B	3937	372B	3958	652B	2F76	5138	2B37	372B	7+977+9Xu+/vRoE77+977+9Xe+/vQ8+77+
0x000110	3942	466A	7676	3733	7676	3730	4A33	6F6C	5552	6D50	7676	3731	504A	4F2B	2F76	652B	2F76	9BFjvv73vv70J3olURmPvv71PJO+/ve+/v
0x000132	652B	2F76	652B	2F76	5458	7676	3731	6461	5548	7676	3730	4137	372B	3954	652B	2F76	652B	e+/ve+/vTXvv71daUHvv70A77+9Te+/ve+
0x000154	2F76	5256	4142	5362	7676	3733	7676	3733	7676	3730	674C	4F2B	2F76	5268	744E	446F	2F4B	/vRVABSbvv73vv73vv70gLO+/vRhtNDo/K
0x000176	2B2B	2F76	5554	7676	3730	3737	372B	3937	372B	3958	6B31	3937	372B	394D	734B	5037	372B	++/vUTvv70777+977+9Xk1977+9MsKP77+
0x000198	394E	4F2B	2F76	5554	7676	3730	2B42	5631	6537	372B	3961	4F2B	2F76	652B	2F76	652B	2F76	9NO+/vUTvv70+BV1e77+9aO+/ve+/ve+/v
0x0001BA	5230	6349	796B	7541	752B	2F76	535A	6157	4634	724A	4F4B	3471	4E36	4B44	752B	2F76	5858	R0cIykuAu+/vSZaWF4rJOK4qN6KDu+/vXX
0x0001DC	7676	3731	644B	652B	2F76	652B	2F76	546E	7676	3731	3637	372B	3937	372B	3952	4F2B	2F76	vv71dKe+/ve+/vTnvv71677+977+9RO+/v
0x0001FE	5374	414D	466E	7676	3730	4437	372B	3937	372B	3937	372B	3959	2B2B	2F76	526F	6A37	372B	StAMFnvv70D77+977+977+9Y++/vRoj77+
0x000220	3937	372B	3937	372B	3937	372B	3937	372B	394B	6C42	7737	372B	3937	372B	3937	372B	394D	977+977+977+977+9KlBw77+977+977+9M
0x000242	2B2B	2F76	6336	7337	372B	3937	372B	3947	5450	7676	3733	7676	3733	7676	3731	504A	2B2B	++/vc6s77+977+9GTPvv73vv73vv71PJ++

Figure 8: File encrypted by Chaos v3

The malware decryptor uses this key to revert the damage done by the malware, as seen in Figure 9. However, this version of the malware will still overwrite files greater than 1MB in a similar fashion to its predecessors, leaving them unrecoverable.

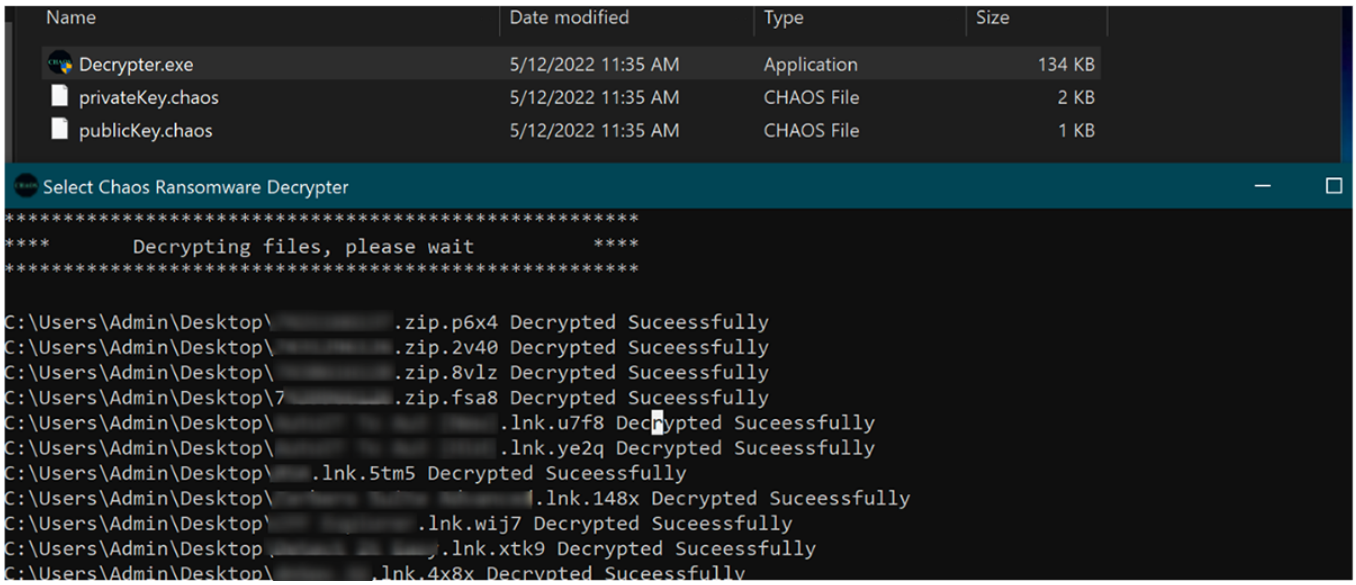


Figure 9: Chaos 3.0 decryptor in action

Files that are smaller than 1MB are passed to the function “EncryptFile,” as shown in Figure 10, which successfully uses AES-256 to encrypt files.

```
private static void encryptDirectory(string location)
{
    try
    {
        string[] files = Directory.GetFiles(location);
        bool flag = true;
        for (int i = 0; i < files.Length; i++)
        {
            try
            {
                string extension = Path.GetExtension(files[i]);
                string fileName = Path.GetFileName(files[i]);
                if (Array.Exists<string>(Program.validExtensions, (string E) => E == extension.ToLower()) && fileName != Program.droppedMessageTextbox)
                {
                    FileInfo fileInfo = new FileInfo(files[i]);
                    fileInfo.Attributes = FileAttributes.Normal;
                    if (fileInfo.Length < 1098576L)
                    {
                        if (Program.encryptionAesRsa)
                        {
                            Program.EncryptFile(files[i]);
                        }
                    }
                    else if (fileInfo.Length > 200000000L)
                    {
                        Random random = new Random();
                        int length = random.Next(200000000, 300000000);
                        string @string = Encoding.UTF8.GetString(Program.random_bytes(length));
                        File.WriteAllText(files[i], Program.randomEncode(@string));
                        File.Move(files[i], files[i] + "." + Program.RandomStringForExtension(4));
                    }
                    else
                    {
                        string string2 = Encoding.UTF8.GetString(Program.random_bytes(Convert.ToInt32(fileInfo.Length) / 4));
                        File.WriteAllText(files[i], Program.randomEncode(string2));
                        File.Move(files[i], files[i] + "." + Program.RandomStringForExtension(4));
                    }
                    if (flag)
                    {
                        flag = false;
                        File.WriteAllLines(location + "/" + Program.droppedMessageTextbox, Program.messages);
                    }
```

If file is less then 1 MB

Figure 10: Chaos v3.0 encryption routine

Chaos 4.0 / Onyx

With the author still hellbent on refining their creation, Chaos v4.0 was soon released. Like previous editions of Chaos Builder, malware produced by the “Chaos Ransomware Builder v4” shows improvements over Chaos 3.0 samples, specifically when it came to use of the AES/RSA encryption routine shown in Figure 10.

These advancements allowed the builder to create ransomware that could successfully handle encrypting slightly larger files – up to 2.1MB in size. Unfortunately, larger files were still overwritten and destroyed.

Chaos 4.0 added the following functionality (shown in Figure 11):

- Ability to change the victim's desktop wallpaper
- Customizable file-extension lists
- Better encryption compatibility

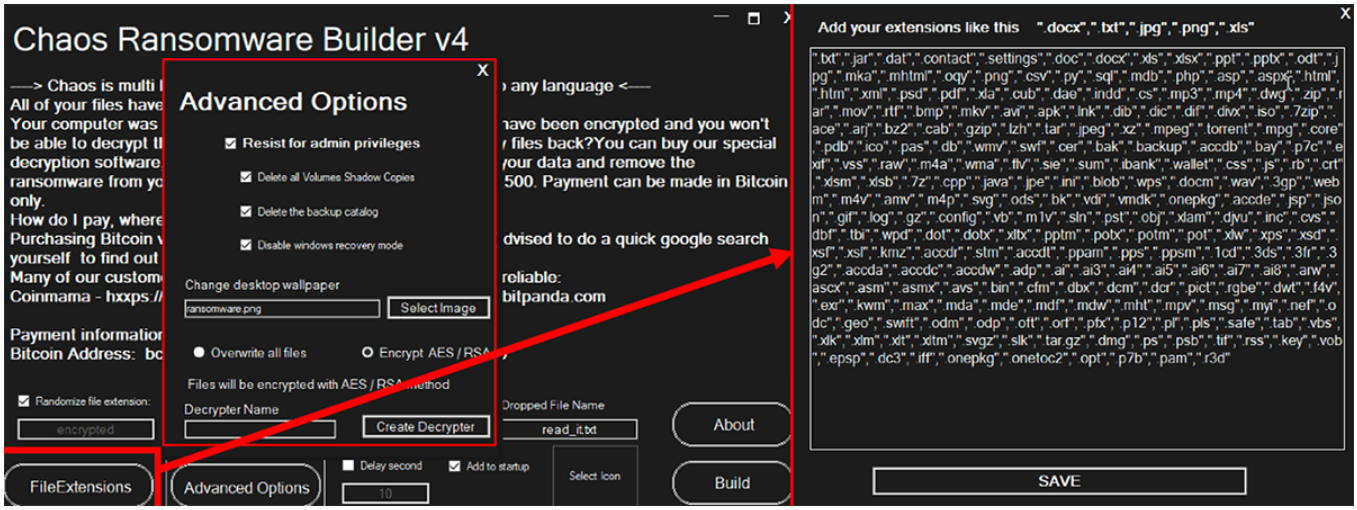


Figure 11: Chaos v4.0 panel

Though Chaos v4.0 had been in-the-wild for several months now, this variant of Chaos rose to notoriety in April 2022 when it was weaponized by a threat group called **Onyx**.

This particular threat group would infiltrate a victim organization's network, steal any valuable data it found, then would unleash "Onyx ransomware," their own branded creation based on Chaos Builder v4.0. To verify this, we've performed tests on samples dubbed Onyx ransomware, and there was a 98% match to a test sample generated via Chaos v4.0.

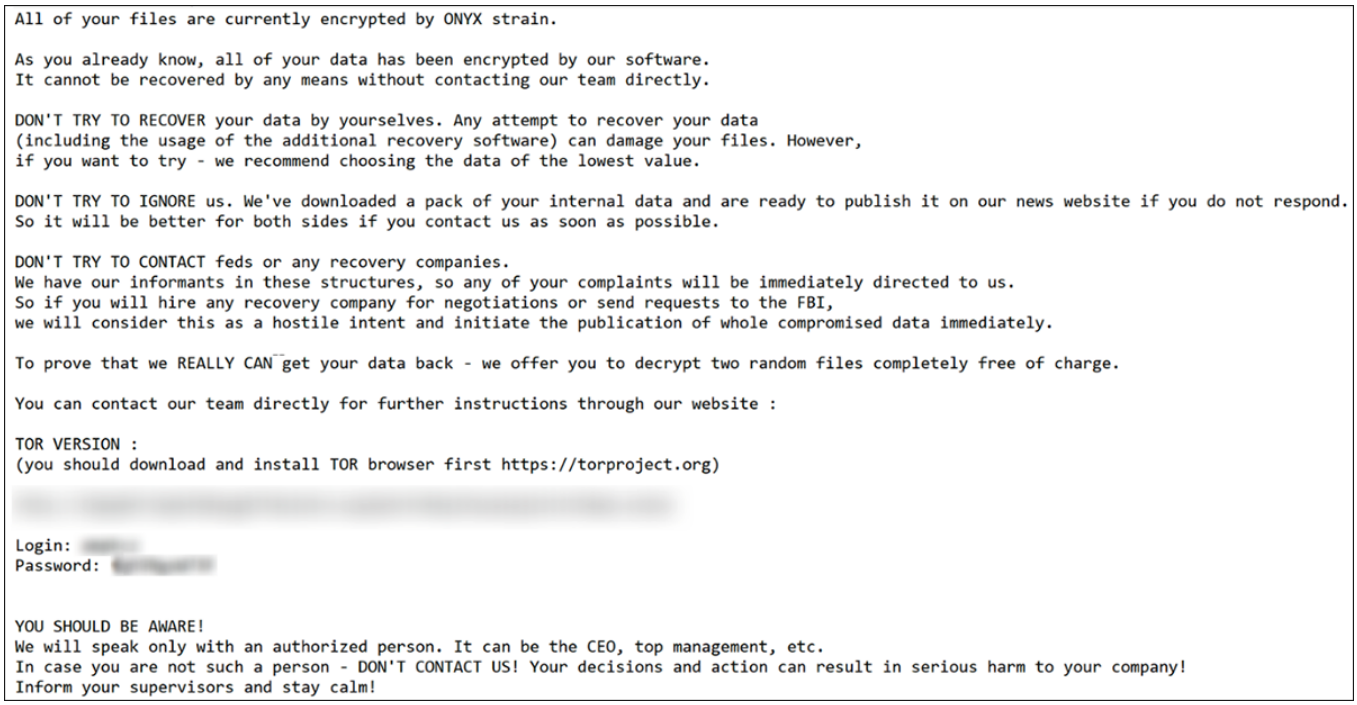
The Onyx group simply customized their ransom note and created a refined list of file extensions they wished to target. There is little other modification to differentiate it from any other samples built with Chaos v4.0.

Onyx Customized File-Extension List							
.txt	.jar	.dat	.contact	.settings	.doc	.docx	.xls
.xlsx	.ppt	.pptx	.odt	.mka	.mhtml	.oqy	.png
.csv	.py	.sql	.mdb	.php	.asp	.aspx	.html
.htm	.xml	.psd	.pdf	.xla	.cub	.dae	.indd
.cs	.mp3	.mp4	.dwg	.zip	.rar	.mov	.rtf
.bmp	.mkv	.avi	.apk	.dib	.dic	.dif	.divx
.iso	.7zip	.ace	.arj	.bz2	.cab	.gzip	.lzh
.tar	.jpeg	.xz	.mpeg	.torrent	.mpg	.core	.pdb
.ico	.pas	.db	.wmv	.swf	.cer	.bak	.backup
.accdb	.bay	.p7c	.exif	.vss	.raw	.m4a	.wma
.flv	.sie	.sum	.ibank	.wallet	.css	.js	.rb
.crt	.xlsm	.xlsb	.7z	.cpp	.java	.jpe	.ini
.blob	.wps	.docm	.wav	.3gp	.webm	.m4v	.amv
.m4p	.svg	.ods	.bk	.vdi	.vmdk	.onepkg	.accde
.jsp	.json	.gif	.log	.gz	.config	.vb	.m1v
.sln	.pst	.obj	.xlam	.djvu	.inc	.cvs	.dbf
.tbi	.wpd	.dot	.dotx	.xltx	.pptm	.potx	.potm
.pot	.xlw	.xps	.xsd	.xsf	.xsl	.kmz	.accdr
.stm	.accdt	.ppam	.pps	.ppsm	.1cd	.3ds	.3fr
.3g2	.accda	.accdc	.accdw	.adp	.ai	.ai3	.ai4
.ai5	.ai6	.ai7	.ai8	.arw	.ascx	.asm	.asmx
.avs	.bin	.cfm	.dbx	.dcm	.dcr	.pict	.rgbe
.dwt	.f4v	.exr	.kwm	.max	.mda	.mde	.mdf

.mdw	.mht	.mpv	.msg	.myi	.nef	.odc	.geo
.swift	.odm	.odp	.oft	.orf	.pfx	.p12	.pl
.pls	.safe	.tab	.vbs	.xlk	.xlm	.xlt	.xltm
.svgz	.slk	.tar.gz	.dmg	.ps	.psb	.tif	.rss
.key	.vob	.epsp	.dc3	.iff	.onetoc2	.opt	.p7b
.pam	.r3d	.dsn	.dmp	.qbw	.imr	.nd	.chw
.spi	.ep	.tlg	.qbb	.msi	.eml	.thmx	.obi
.chm	.pub	.md5	.spf	.spk	.idx	.scc	.jdk
.cnt	.tum	.dsm	.reg	.cfg	.ldf	.bat	.dxf
.SLDDRW	.SLDPRT	.SLDASM	.mil	.dlf	.c4	.pdx	.onepkg
.url	.jpg						

Unlike the default Chaos ransom note, which provided little in the way of instructions or guidance to affected victims, the group behind Onyx implemented a leak site called “Onyx News,” hosted via an Onion page on the anonymous Tor network. Onyx used it to give victims more information on how to recover their data.

The ransom note for Onyx (seen below in Figure 12) gave the address, login and password credentials that enabled the victim to logon and engage in a discussion with the threat actors behind the ransomware attack. This conversation usually led to the malware operator demanding a fee of Bitcoin cryptocurrency to release the decryptor key to the victim.



```
All of your files are currently encrypted by ONYX strain.

As you already know, all of your data has been encrypted by our software.
It cannot be recovered by any means without contacting our team directly.

DON'T TRY TO RECOVER your data by yourselves. Any attempt to recover your data
(including the usage of the additional recovery software) can damage your files. However,
if you want to try - we recommend choosing the data of the lowest value.

DON'T TRY TO IGNORE us. We've downloaded a pack of your internal data and are ready to publish it on our news website if you do not respond.
So it will be better for both sides if you contact us as soon as possible.

DON'T TRY TO CONTACT feds or any recovery companies.
We have our informants in these structures, so any of your complaints will be immediately directed to us.
So if you will hire any recovery company for negotiations or send requests to the FBI,
we will consider this as a hostile intent and initiate the publication of whole compromised data immediately.

To prove that we REALLY CAN get your data back - we offer you to decrypt two random files completely free of charge.

You can contact our team directly for further instructions through our website :

TOR VERSION :
(you should download and install TOR browser first https://torproject.org)

[redacted]

Login: [redacted]
Password: [redacted]


YOU SHOULD BE AWARE!
We will speak only with an authorized person. It can be the CEO, top management, etc.
In case you are not such a person - DON'T CONTACT US! Your decisions and action can result in serious harm to your company!
Inform your supervisors and stay calm!
```

Figure 12: Onyx Ransom note

The threat actors behind Onyx would post a list of victims of their attacks. The leak site included information about their victims, along with publicly viewable stolen data (as seen in Figure 13).

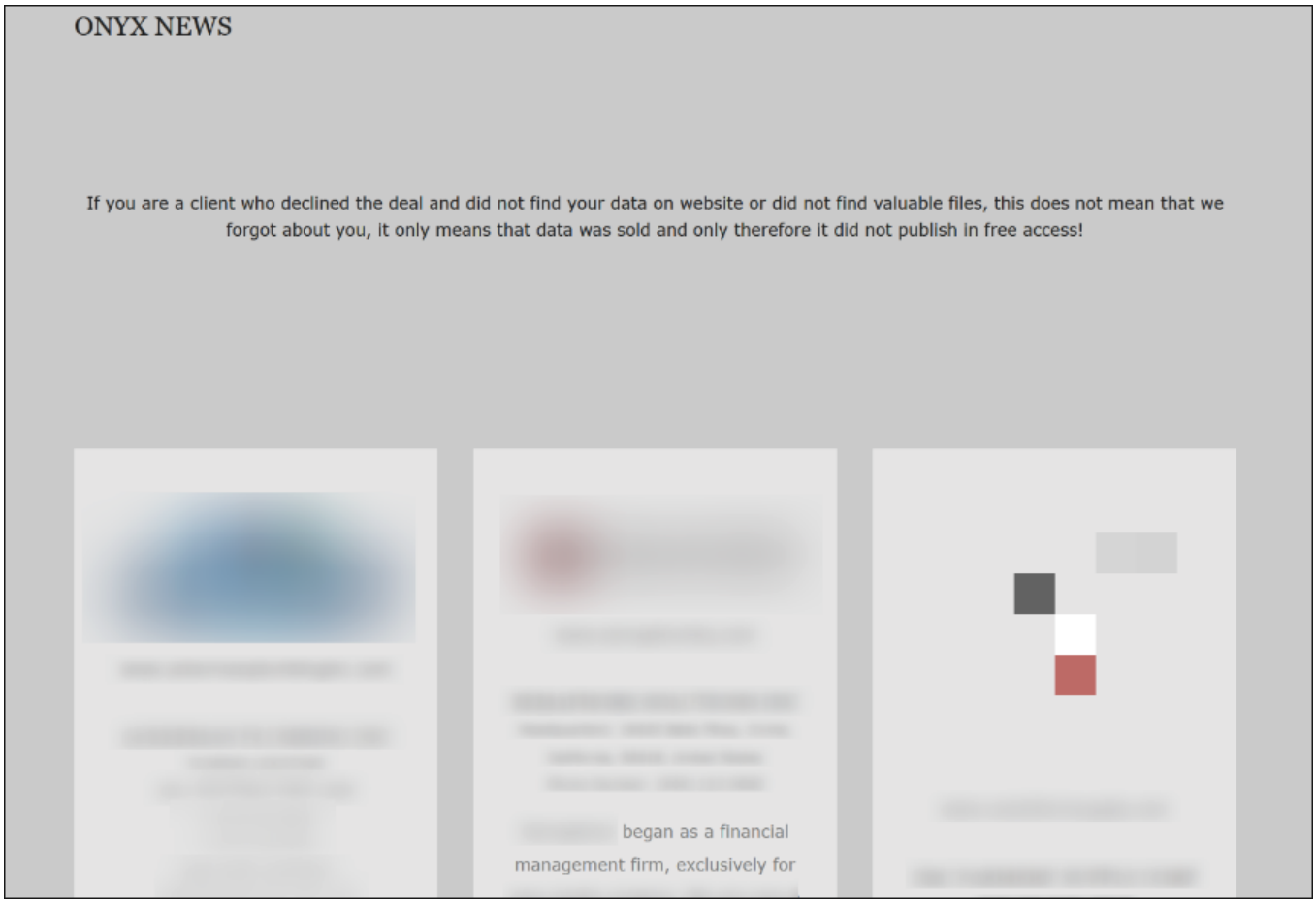


Figure 13: Onyx leak site

As one might expect, Onyx suffered from many of the same flaws as other “ransomware” generated by Chaos v4.0. For example, it would only encrypt smaller files, while rendering larger files unrecoverable.

Chaos 5.0/Yashma

Chaos Ransomware Builder v5.0 was released in early 2022, once again built on the foundation of the previous version, Chaos v4.0. Chaos 5.0 attempted to resolve the largest problem of previous iterations of the threat, namely that it was unable to encrypt files larger than 2MB without irretrievably corrupting them.

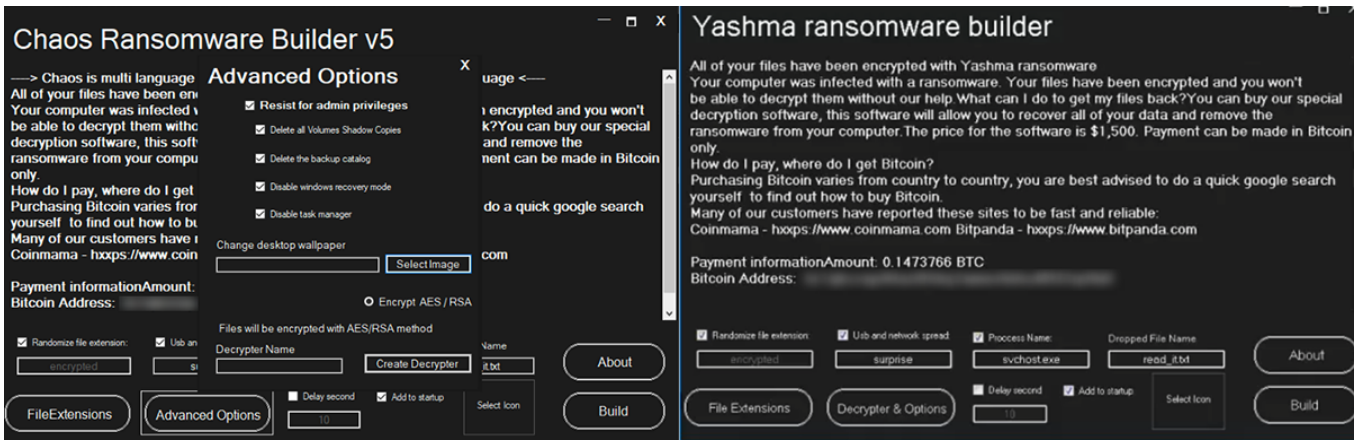


Figure 14: Comparisons between Chaos v5.0 and Yashma

This version of Chaos encrypts victim files with AES-256, and then appends a key to the end of each file to signify they’ve been encrypted. This key is then used by the newly designed decryptor to decode the files, returning them to their original, unencrypted state.

Customization options from Chaos v4.0 are also unchanged, which gives the threat actor the following options:

- Create a custom ransom note
- Run on startup
- Drop the malware as a different process
- Sleep prior to execution
- Set desktop wallpaper
- Encrypt specific file-extensions
- Disrupt recovery systems
- Propagate the malware over network connections
- Choose a custom encryption file-extension
- Disable the Windows® task manager

Though slower to complete its malicious tasks on the victim device than when it was simply destroying files, the malware finally operates as expected, with files of all sizes being properly encrypted by the malware and retaining the potential to be restored to their former unencrypted state.

Figure 15: Advances from Chaos 4.0 to Chaos 5.0 to Yashma samples

After the release of Chaos Ransomware Builder v5, its sixth iteration had yet another re-branding, this time being renamed Yashma.

Though few instances of Yashma had been found in-the-wild at the time of writing this blog, the malware operates nearly identically to its Chaos v5.0 counterpart. The “Yashma” version has just two advancements added to differentiate itself from previous iterations.

It now has functionality to prevent it from running based on the victim’s location, determined via the language set on the victim device. This is a ploy often used by threat actors to avoid legal trouble in their country of origin.

The malware can now also stop various services on the victim device. Based on our analysis of Yashma samples taken from the wild, these are the services we’ve seen the updated malware target:

- Antivirus (AV) solutions
- Vault services
- Backup services
- Storage services
- Remote Desktop services

Service Name	**Product**
BackupExecAgentBrowser	Veritas Open Exchange
BackupExecDiveciMediaService	Veritas
BackupExecJobEngine	Veritas
BackupExecManagementService	Veritas
vss	Volume Shadow Copy
sql	Structured Query Language
svc$	
memtas	MailEnable
sophos	Sophos
veeam	Veeam Software
backup	Generic match for any service with backup in the name
GxVss	Commvault
GxBlr	Commvault
GxFWD	Commvault
GxCVD	Commvault
GxCIMgr	Commvault
DefWatch	Norton AntiVirus
ccEvtMgr	Norton AntiVirus
SavRoam	Symantec AntiVirus
RTVscan	Symantec Internet Security
QBFCService	QuickBooks
Intuit.QuickBooks.FCS	QuickBooks
YooBackup	Wooxo Yoo Backup
YooIT	Wooxo Yoo Backup
zhudongfangyu	360 Safe Guard
sophos	Sophos
stc_raw_agent	StorageCraft Volume Snapshot
VSNAPVSS	StorageCraft Volume Snapshot
QBCFMonitorService	Intuit Quickbooks
VeeamTransportSvc	Veeam Software
VeeamDeploymentService	Veeam Software
VeeamNFSSvc	Veeam Software
veeam	Veeam Software
PDVFSService	Veritas

BackupExecVSSProvider	Veritas
BackupExecAgentAccelerator	Veritas
BackupExecRPCService	Veritas
AcrSch2Svc	Acronis
AcronisAgent	Acronis
CASAD2DWebSvc	ArcServe
CAARCUpdateSvc	ArcServe
TeamViewer	TeamView

Conclusion

Chaos (and subsequently Yashma) have seen rapid development and advances throughout the last year, with its most recent iteration, “Yashma” (Chaos v6.0), found in-the-wild in mid-2022.

Chaos started as a relatively basic attempt at a .NET compiled ransomware that instead functioned as a file-destructor or wiper. Over time it has evolved to become a full-fledged ransomware, adding additional features and functionality with each iteration.

What makes Chaos/Yashma dangerous going forward is its flexibility and its widespread availability. As the malware is initially sold and distributed as a malware builder, any threat actor who purchases the malware can replicate the actions of the threat group behind Onyx, developing their own ransomware strains and targeting chosen victims.

This makes tracking ransomware attacks attributed to Chaos quite difficult, as Indicators of Compromise (IOCs) can change with each sample a malware builder produces. Additionally, even the most novice threat actors can find links to releases and leaks of this threat on either dark web forums or third-party malware repositories, and then use Chaos/Yashma to carry out future malicious activities.

Who is Affected?

Variants of Chaos have been seen in-the-wild for a year now, and are likely used by multiple threat actors.

Often, victims are being targeted using Onyx (based on Chaos v4.0), with the latest attacks affecting U.S.-based services and industries including:

- Emergency Services
- Medical
- Finance
- Building
- Agriculture

Mitigation Tips

In order to avoid becoming a victim of Choas/Yashma:

- Keep updated backups in case of data destruction, file-loss or file-corruption.
- Have a ransomware business continuity plan ready to be put into action.
- Avoid and report suspicious links and files.

YARA Rule

The following YARA rule was authored by the BlackBerry Research & Intelligence Team to catch the threat described in this document:

```
import "pe"

   rule Mal_Win32_ChaosRansomware_2022
{
   meta:
```

```
   description = "Detects Ransomware Built by Chaos Ransomware Builder"
   author = "BlackBerry Threat Research"
   date = "2022-05-10"
   license = "This Yara rule is provided under the Apache License 2.0 (https://www.apache.org/licenses/LICENSE-2.0) and open to any user or organization, as long as you use it under this license and ensure originator credit in any derivative to The BlackBerry Research & Intelligence Team"

   strings:
      //Ransom References
      $x1 = "Encrypt" ascii wide
      $x2 = "(?:[13]{1}[a-km-zA-HJ-NP-Z1-9]{26,33}|bc1[a-z0-9]{39,59})" ascii wide
      $x3 = "read" ascii wide

      //Ransom Hex
      $r1 = { 20 76 69 72 75 73 }
      $r2 = { 72 00 61 00 6e 00 73 00 6f 00 6d 00 77 00 61 00 72 00 65 }

      //Shadow Copy Delete
      $z0 = "deleteShadowCopies" ascii wide
      $z1 = "shadowcopy" ascii wide

     condition:

      //PE File
      uint16(0) == 0x5a4d and

      // Must be less than
      filesize < 35KB and

      // Must have exact import hash
      pe.imphash() == "f34d5f2d4577ed6d9ceec516c1f5a744" and

      //Number of sections
      pe.number_of_sections == 3 and

      //These Strings
      ((all of ($x*)) and (1 of ($r*)) and (1 of ($z*)))

}
```

```
import "pe"

   rule Mal_Win32_Onyx_Strain_Chaos_Ransomware_2022
{
   meta:
   description = "Detects Onyx Ransomware build off of Chaos Builder v4"
   author = "BlackBerry Threat Research"
   date = "2022-05-10"
   license = "This Yara rule is provided under the Apache License 2.0 (https://www.apache.org/licenses/LICENSE-2.0) and open to any user or organization, as long as you use it under this license and ensure originator credit in any derivative to The BlackBerry Research & Intelligence Team"

         strings:
         $s1 = "(?:[13]{1}[a-km-zA-HJ-NP-Z1-9]{26,33}|bc1[a-z0-9]{39,59})" wide
         $s2 = "All of your files are currently encrypted by ONYX strain." wide
         $s3 = "Inform your supervisors and stay calm!" wide

         condition:

         //PE File
         uint16(0) == 0x5a4d and
```

```
        //Directories
        pe.data_directories[pe.IMAGE_DIRECTORY_ENTRY_COM_DESCRIPTOR].size != 0 and

        //All strings
        all of ($s*)

}
```

```
import "pe"

   rule Mal_Win32_Chaos_Builder_Ransomware_2022
{
   meta:
   description = "Detects Chaos Ransomware Builder"
   author = "BlackBerry Threat Research"
   date = "2022-05-10"
   license = "This Yara rule is provided under the Apache License 2.0 (https://www.apache.org/licenses/LICENSE-2.0) and open to any user or organization, as long as you use it under this license and ensure originator credit in any derivative to The BlackBerry Research & Intelligence Team"

        strings:

                $s0 = "1qw0ll8p9m8uezhqhyd" ascii wide

                $s1 = "Chaos Ransomware Builder" ascii wide

                $s2 = "payloadFutureName" ascii wide

                $s3 = "read_it.txt" ascii wide

                $s4 = "encryptedFileExtension" ascii wide

                $x0 = "1098576" ascii wide

                $x1 = "2197152" ascii wide

        condition:

//PE File

                uint16(0) == 0x5a4d and

                //All strings

                ((all of ($s*)) and (1 of ($x*)))


}
```

Indicators of Compromise (IoCs)

Appended file extension:

- .[a-z][A-Z]{4} (default)

Registry Addition:

RegKey Add:
SOFTWARE\\Microsoft\\Windows\\CurrentVersion\Run

- **Key:** Microsoft Store
- **Value:** %Current Path/Location%

Mutex:

- **1qw0ll8p9m8uezhqhyd**

Files Dropped:

- %AppData%\Roaming\svchost.exe

RYUK .NET Builder

Name	Example SHA256
Builder v1	0d8b4a07e91e02335f600332644e8f0e504f75ab19899a58b2c85ecb0887c738
Ransomware v1	f41962f51583d08ed7ca796b125f2300e03035b8790590e8e2d036f53bd9be79

Chaos 2.0+

Name	Example SHA256
Builder v2	325dfac6172cd279715ca8deb280eefe3544090f1583a2ddb5d43fc7fe3029ed
Ransomware v2	202e6f0501abaf85b5c53bafcd70e31aa20e65c140f13b15d45e60c00b0413c0

Chaos 3.0+

Name	Example SHA256
Builder v3	a98bc2fcbe8b3c7ea9df3712599a958bae0b689ae29f33ee1848af7a038d518a
Ransomware v3	1d71add7ecfe9be642a84d080dfbc4b602a0f49239938a337c7c860eb7edf3fe
Decryptor v3	31c783b0211bf4b72f10b6dac6f933b7aba570ff7a8c608fd8eb46311aec0091

Chaos 4.0+

Name	Example SHA256
Builder v4	392a3adb44ab2640290f88f751d7608bc66a1c7df845fa1d0baa0aea78ac7a49f3432c74402aa36468d6641d5ccc15c1e0ceb083bc0f7e73d2b5dbfa0cfb9974
Ransomware v4	77f3cddd3cb245b2645b4885ebf2080f7c23f7101f4c3ce27239ea0326a8fcc5
Decryptor v4	fac94a8e02f92d63cfdf1299db27e40410da46c9e86d8bb2cd4b1a0d68d5f7a2

Chaos 5.0+

Name	Example SHA256
Builder v5	6562f92ba9d4784bf30e87681e538e0f7b8eff26811ace6be8970b0a8e3e3ca0
Ransomware v5	7a7f9b043b83184a537e09b76b811546d3032c776246d28ae0e4f6ca5f9f92b8
Decryptor v5	8f236217c4e280b4950cedccbc6bbd03f31902525a7f9fe98b6de5bb50787cfb