

FORTIGUARD LABS THREAT RESEARCH

# Ransomware Roundup - Black Basta

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On a bi-weekly basis, FortiGuard Labs gathers data on ransomware variants of interest that have been gaining traction within our datasets and the OSINT community. The Ransomware Roundup report aims to provide readers with brief insights into the evolving ransomware landscape and the Fortinet solutions that protect against those variants.

This latest edition of the Ransomware Roundup covers the Black Basta ransomware.

**Affected platforms:** Microsoft Windows, VMWare ESXi servers

**Impacted parties:** Microsoft Windows and ESXi Users

**Impact:** Encrypts files on the compromised machine and demands ransom for file decryption

**Severity level:** High

## Black Basta Ransomware Overview

Over the past few months, Black Basta ransomware has made headlines for allegedly compromising high-profile European and North American organizations across a variety of industries, such as outsourcing, technology, and manufacturing.

The history of Black Basta ransomware dates back to at least April 2022, with a professional organizations company in the United States being one of its first victims. Since then, Black Basta has slowly expanded their operations, with the group allegedly

compromising and stealing data from a US government contractor and a US aerospace and defense company in late 2022.

This ransomware is considered a successor to the now-defunct Conti ransomware because some former Conti members are believed to be in the Black Basta group. Some also believe there is a potential connection between Black Basta and the Fin7 threat actor due to the groups' similar Tactics, Techniques, and Procedures (TTPs).

Black Basta operates a Ransomware-as-a-Service (RaaS) model, in which the developers offer a service such as ransomware, an **infrastructure for payment processing** and ransom negotiation, and technical support to its affiliates. Once an affiliate gets a victim to pay a ransom, the Black Basta operator receives a portion. Affiliates are responsible for selecting their targets, **moving laterally across a victims' network** (often by using tools supplied by ransomware operators, leveraging dual-use tools, and employing **living-off-the-land tactics**), **stealing data**, and deploying the ransomware. **Tools** reportedly used by Black Basta threat affiliates include **Psexec, Windows Management Instrumentation (WMI), PowerShell, Netcat, BITSAdmin, BCDEdit, SystemBC, Mimikatz, ColbaltStrike, Brute Ratel C4, remote access tools, and RClone.**

Before deploying the ransomware to compromised networks, Black Basta attackers install and configure the open-source file-transfer utility "RClone" to **steal the data that they collected**. The stolen data is then used for their double-extortion scheme, where the files are leaked to the public if a victim fails to meet the ransom demands.

The Black Basta ransomware was initially only supported on Windows platforms. However, the Black Basta developer released a new variant targeting ESXi systems in 2022. The group also updated and released Black Basta ransomware 2.0, which reportedly incorporates a new encryption algorithm.

Note that FortiGuard Labs previously released a Threat Signal for Black Basta ransomware on May 2<sup>nd</sup>, 2022:

- **New Ransomware "Black Basta" in the Wild**

## Infection Vector

Black Basta has been seen to use techniques from **spearphishing to purchasing access through Initial Access Brokers (IABs)** to gain initial access. Access has also been obtained using malware from other groups, such as **QakBot (QBot)**. The exploitation of

the PrintNightmare (CVE-2021-34527) and Follina (CVE-2022-30190) vulnerabilities have also been reported.

More details on CVE-2021-34527 and CVE-2022-30190 are available as Outbreak Alerts previously released by FortiGuard Labs:

- **Microsoft PrintNightmare Vulnerability**
- **Microsoft MSDT Follina Vulnerability**

## Ransomware Execution

FortiGuard Labs is aware that the ransomware component of Black Basta has been compiled as a Windows executable, more recently as a Windows DLL, and additionally as a Linux executable

## Windows Executable and DLL

The functionality between the two versions is identical, as is the final step in the attack chain.

Figure 1 . Launching the Black Basta DLL.

Black Basta has been observed using the XChaCha20 stream cipher (<https://en.wikipedia.org/wiki/ChaCha20-Poly1305>) to encrypt its files. This is built into the software using the Crypto++ C++ library (<https://www.cryptopp.com/>).

Figure 2. A partial list of Crypto++ library function calls.

Files are encrypted quickly using multi-threading, with the file extension for encrypted files being unique for each ransomware build.

Figure 3. File extension hardcoded in this Black Basta file.

Figure 4. Files encrypted by Black Basta and its ransom note.

Figure 5. Variation in file extensions for encrypted files.

The ransom note is assembled and dropped into each directory that includes files that have been encrypted. Note in Figure 6 that the Login ID (the ID used by the threat actor to identify the victim when they make contact) is hardcoded into the ransomware, which suggests some customization for a particular victim.

Figure 6. Building the ransom note. Note that the "Login ID" is hardcoded here.

The ransom note labeled "Instructions\_read\_me.txt" is automatically opened in Notepad so the victim can easily see it.

Figure 7. Black Basta ransom note as seen in Notepad.

The note demands that the victim use Tor to contact the ransomware gang = at a specified ".onion" site. Instructions for downloading and installing the Tor browser are provided. It also suggests that the victim not contact a recovery company or outside ransom negotiators.

## Linux Executable

Black Basta has also developed a Linux executable primarily designed to target VMWare ESXi deployments rather than more general individual Linux systems. This can be easily shown by running the ransomware on a non-ESXi deployment. When executed, the malware will be unable to locate the "/vmfs/volumes/" directory and be

unable to run. This directory (VMFS is the “Virtual Machine File System,” and “volumes” is where VM disk images reside, which would be the main target of the ransomware). If that folder is then put in place, it will execute (although nothing will occur on a non-ESXi host).

Figure 8. Testing without “/vmfs/volumes/” present.



Figure 9. Testing with “/vmfs/volumes/” present.

The Linux version of Black Basta has several **command line flags that suggest it is designed to be executed by an individual who has remote access to a victim ESXi server.**

Figure 10. Command line arguments.

Again, executing in a non-ESXi environment fails. However, it allows for the tracing of the event in assembly.

Figure 11. Executing the “-killesxi” command line flag.

The “-killesxi” command triggers a fairly involved Bash sequence, as shown in Figure 12 below.

Figure 12. The Bash sequence for the “-killesxi” command line flag.

As ESXi installations are the primary focus of the Black Basta Linux variant, it is only interested in four related file types for encryption: “.vmsd”, “.vmx”, “vmxf”, and “vmdk”.

Figure 13. File types of interest.

As with the Windows version, the Linux version of Black Basta hardcodes the file extension for encrypted files into the code for deployment, and it changes from file to file.

Figure 14. File extension hardcoded in the Linux version of Black Basta.

Whether using the “-forcepath” command line flag to encrypt a single, non-standard directory with files of interest or the default location of “/vmfs/volumes/”, this version will encrypt files as efficiently as the Windows version.

Figure 15. Encrypted files on a Linux host.

The ransom note for the Linux version of Black Basta is identical to the Windows version. Again, the victim must contact the gang at a specified “.onion” site.

Figure 16. Black Basta Linux ransom note.

## Black Basta Tor Sites

As the ransom notes above show, the Black Basta threat actors want their victims to contact them at a specific Tor address. Once there, the site requires the visitor to enter their “Login ID” from the ransom note to identify the organization they’re from, along with the completion of a captcha to prevent automated connections.

Figure 17. Black Basta Tor “chat” site.

In addition to the communication site, Black Basta operates a “name and shame” Tor site titled “Basta News”.

Figure 18. Black Basta “Basta News” site.

This site provides the group’s “proof” that it has compromised a given organization, publication status, and visitor count.

## Victimology

During our investigation, Black Basta’s data leak site listed more than 200 victims in North America and Europe. More than 60% of the alleged victims are U.S. organizations. Distant second place belongs to Germany at 15%, followed by Canada at close to 6%.

We divided the victim list into four groups: older victims to newer victims. While the oldest victim group spreads across 12 countries, the second and third group victims include only eight countries. The latest victim group has only six countries (U.S., Germany, Canada, Italy, UK, Slovenia), which may indicate that Black Basta affiliates

have narrowed the target list.

As for its targeted industries, more than 25% of the victims listed on the leak site are in manufacturing, construction, service, and retail. However, 50% of the victims are in those four industries. Other affected sectors include legal, warehouse, finance, and IT.

Based on what's in the data leak site, over 80% of the victims suffered from some or all of their stolen data being leaked to the public.

## Fortinet Protections

Fortinet customers are already protected from this malware variant through AntiVirus, and FortiEDR services, as follows:

FortiGuard Labs detects known Black Basta ransomware variants with the following AV signatures:

- W32/BlackBasta.A!tr.ransom
- W32/BlackBasta.D!tr.ransom
- W32/BlackBasta.F!tr.ransom
- W32/BlackBasta.FA18!tr.ransom
- W32/BlackBasta.PA!tr.ransom
- W32/BlackBasta.SA!tr.ransom
- W32/BlackBasta.4E32!tr.ransom
- W32/Filecoder\_BlackBasta.A!tr.ransom
- W32/Filecoder\_BlackBasta.B!tr
- W32/Filecoder\_BlackBasta.B!tr.ransom
- W32/Filecoder\_BlackBasta.C!tr
- W32/Filecoder\_BlackBasta.C!tr.ransom
- W32/Filecoder\_BlackBasta.D!tr.ransom
- W32/Filecoder\_BlackBasta.E!tr.ransom
- W32/Filecoder\_BlackBasta.F!tr
- W32/Filecoder\_BlackBasta.F!tr.ransom
- W32/Filecoder\_BlackBasta\_AGen.A!tr
- W32/Filecoder\_BlackBasta\_AGen.A!tr.ransom
- W32/Ransom.YXDADZ!tr.ransom
- W32/Ransom\_Win64\_BASTACRYPT.LKVCAGU!tr.ransom
- W32/Ransom\_Win64\_BASTACRYPT.YXDCXZ
- W64/BlackBasta.A!tr.ransom
- W64/BlackBasta.F!tr.ransom

- W64/Filecoder\_BlackBasta.A!tr.ransom
- ELF/BASTAD.GVYD!tr.ransom
- ELF/BlackBasta.6018!tr.ransom
- ELF/BlackBasta.D3E1!tr.ransom
- Linux/Filecoder\_BlackBasta.A!tr
- W32/Filecoder.4556!tr.ransom
- W32/Filecoder.506B!tr.ransom
- W32/Filecoder.OKW!tr
- W32/Filecoder.OMT!tr.ransom
- W32/GenKryptik.GBPY!tr.ransom
- W32/GenKryptik.GBRK!tr.ransom
- W32/GenKryptik.GCPP!tr.ransom
- W32/GenKryptik.GDSS!tr.ransom
- W32/GenKryptik.GFPG!tr.ransom
- W32/GenKryptik.GJNV!tr
- W32/Kryptik.ATL!tr.ransom
- W32/Kryptik.CTJIRHO!tr.ransom
- W32/Kryptik.FKXJ!tr
- W32/Kryptik.FYBKLIK!tr
- W32/Kryptik.HOZJ!tr
- W32/Kryptik.HPRO!tr
- W32/Kryptik.HRKT!tr.ransom
- W32/Kryptik.HSAH!tr
- W32/Kryptik.HSSE!t
- W32/Kryptik.HSSE!tr
- W32/Kryptik.HSSE!tr.ransom
- W32/Kryptik.HTEE!tr
- W32/Kryptik.HTIE!tr
- W32/Kryptik.HTMN!tr
- W64/GenKryptik.GEJW!tr
- W32/ESQF.R002C0DC423!tr
- W64/REntS.1!tr.ransom
- W32/Generik.MJIYVEE!tr
- W32/Generik.NPGU!tr.ransom
- W32/PossibleThreat
- W32/PossibleThreat!tr.ransom
- Malicious\_Behavior.SB
- PossibleThreat
- W32/Malicious\_Behavior.SBX
- W32/Malicious\_Behavior.VEX



The FortiGuard AntiVirus service is supported by FortiGate, FortiMail, FortiClient, and FortiEDR. Fortinet EPP customers running current AntiVirus updates are also protected.

The following IPS signatures are in place for CVE-2021-34527 and CVE-2022-30190 respectively:

- MS.Windows.Print.Spooler.AddPrinterDriver.Privilege.Escalation
- MS.MSDT.URL.Protocol.Remote.Code.Execution

FortiEDR detects and blocks the execution of Black Basta ransomware before it can execute.

FortiEDR detects and blocks Black Basta ransomware from deleting volume shadow

copies using the vssadmin utility with a security event triggered by the 'Suspicious Application' rule within the Ransomware Prevention security policy.

FortiEDR detects and blocks Black Basta ransomware from encrypting files within the "file Encryptor - Suspicious File Modification" rule in the Ransomware Prevention security policy.

FortiEDR detects and blocks Black Basta ransomware from changing the desktop background a 'Modify OS Setting' event triggered by the 'Unconfirmed Executable' rule in the Ransomware Prevention security policy.

**Note:** If you believe this or any other cybersecurity threat has impacted your organization, please contact our **Global FortiGuard Incident Response Team**.

## IOCs

### File-based IOCs:

SHA2	Malware
0180364e7dd8b5440920f1a85330bc5ec7e80756cb633014846378b9a5c9debd	
03309c90e6c60a2e3cd44374efa3003ae10cd9e05ba6a39c77aa5289b32cb969	
0595876dcfb02cbe4d85d3f9cb374b24473e5b338df781e18bd059ea48d60119	
0825ae48606f05086efb7d2d03db4331a03e21017bdf1470cdc597c51381e6f5	
08376a7b9bad22cc76ed74bcf1ff3c36fd26549c747e251980439074c0a22b65	
09bc7247b50a166996b667b9a6e696cfbafa203ffcbec46ad0cca27deacd5c25	
0bce6dc27d2cbdc231b563427c3489ddc69a0a88012abccd49b32c931dd93a81	
0d6c3de5aebbbe85939d7588150edf7b7bdc712fceb6a83d79e65b6f79bfc2ef	
10cd56acdf1bc7e91610f18583c4f88dc2f64a3caaf4faa8a3bccf3938599245	
1354254499b2e3353708747d36c334074f40c1f726ea7590384f2	

192c972f8c3
1391c20a26f248f7c602f20096bf1886cfe7e4d151602a1258a9bbe7c02c1c80
1552079359d5e51fb862c3be8cc0dacao5ae39b43255b87a9c185414944f8c43
15560b1e35a3a8612a7ba91d00dea6b8dd6e4f3f857399c22c0c75377c9b31a2
158e40a0009e6602303952694df6f3a49f40705c7ceb8b85854c0f1733aa2963
15abbbf9fbce7f5782c1654775938dcd2ce0a8ebd683a008547f8a4e421888c4
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1a8a283732f920d34233eac14ab03d681f3837b2e759df4ff1dd383249074e46
1bb7e645d4ff753157bbdd78829276356cb6660a767ab7158fc7dec3fe8b0e2f
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1dd04aab97d6b65ac93ae3e8cfb4d3175d99f5b0395418abeb771d2db364cd3c
1ed076158c8f50354c4dba63648e66c013c2d3673d76ac56582204686aae6087
203d2807df6ef531efbec7bfd109986de3e23df64c01ea4e337cbe5ba675248b
21033cd24a9d775d7daa7bbc5c5b007553f205ac0febb6bae3fa35c700676bda
22aba8e0bdbbc9d50f6070ec50405c8ef31e5e22ad18fa9cc94d137fee0dd0536
2327018dab0e3beaed2123bcb5392405ab1e502dfa72a5a32c2c164346bb9bc6
240450721e47d4cabc1d15d074f0a3a7b3e0b9f1a791006046e211ec302c28b0
245af5ac27f701bf320971c69f9317b37faaac228731a77fb06ad9944c9b6772
2558d0817586306d0ddf7beadd371785cd0a0b7ed860ac62760dbbc92866008a

Black Basta  
ransomware

2e2ec16d0b77bddbc2e88a0a914e7466a3c9dee38dc73a66dddd 005e92bb3d6e
2edcf98e7031dad7d90df525db2951b83b2a82de57dfe853c98eae db609e49c4
2f8796499a7df61817126eb00c8aedff7b709f7f652503b2b9bd1c6 a2f7f61e4
31e2288f0dd395423c22d2d20c9562211e97a2ab06d2403cf0202 03abe835993
3276df5b3b112c052d56919ad33de8404ec1a37d47d2c28d9deb f8323df22e16
350ba7fca67721c74385faff083914ecdd66ef107a765dfb7ac08b3 8d5c9c0bd
41b3d0d4419eac75017e76fe3bd76ec6a968cb68af4cf6335a27a1 96c47bac25
434a4f21549a1ae3dd623bfbc084d43c330821a279b2f4a4abdc7c a6e5584bfb
43e43276e250fc8a971fc3f0308827f98df09c52c08a09577b0cf6 36e9dc65ed
43f475bfa1f2c4fc35f08e6a96ca9698bd6f86357564d82436555e 0f43aeff1a
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49ec36f03629f5993e496cfee6c5274c5f1db49bde704ef77ffe05f edd60e82b
4b83aaecddfc8cf5caeff3cb30fee955ecfc3eea97d19dccf86f24c 77c41fc4
4fa2e370c3e78afb50cdeac32b9b4f3e5262312b04b461d05ff736 78f5526530
50d2d4c05bf810c1b57dd93f41430ddcd93838cc5367ed2c81de4 563f59860c9
51eb749d6cbd08baf9d43c2f83abd9d4d86eb5206f62ba43b7682 51a98ce9d3e
5211ad84270862e68026ce8e6c15c1f8499551e19d2967c349b46 d3f8cfcdcaa
5c6c40ddb666fe8b3a85fef39b6594337ebc6607b5eb9a4f16a62 efc4402a0cb
5caa3f9665561b5b02f944cc33fb12faaec87d6ccb69af6a12d0f82

Black Basta  
ransomware

cd0a5981d
5dcbec6d3370a2af103500325279d0c4f53df4c5a0c85b20a467797e61cb75ae
5ed057e99aed8356ccdf698f38fd3fe9ceabe517e1bd3245479fdd3cbb966fa9
60e9e8e25b64eabb59dc8667c286d91a8f4c6b6f9ea9aa12b55e7a2cb78d15f8
6264cae0ef62128667a295aef7154f4feb22dbfe53fc09fd01d122e01d43995e
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80c0420d52e
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c4c8be0c939e4c24e11bad90549e3951b7969e78056d819425ca5
3e87af8d8ed
c5320ee1e5753c5cec7611e4c61aaf23778b5924aefac3a546318d
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08823214f
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cf7fa7f54b06b09b750b8c50e4f8893e25ceaccfa9be8225f3279d
c4e4ce0f4d
d0f05cd6957e1e93d1ca4154762b4d4bcaeb16c0bf878b59a1500c
4974ef4502
d1949c75e7cb8e57f52e714728817ce323f6980c8c09e161c9e54a1
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d408fe3421f520710e8a6ac6f0b9a1759b03ab3f44134e451d72af3
bb79a3ad0
d5770cd6451de0c45426fae230e41f3551af1c9dda690d2be44f69
be3721d929
dc90ba17158501e8f6589d3805789f9ac51cefaafec63d6e00e10c7
e0355faab
dd32c037ed9b72acb6eda4f5193c7f1adc1e7e8d2aefcdd4b16de2f
48420e1d3
df5b004be71717362e6b1ad22072f9ee4113b95b5d78c496a90857
977a9fb415
e05791112b72f7430b74138bac4d4efcd2fbd1909714f8366a43eab
77b26b13e
e28188e516db1bda9015c30de59a2e91996b67c2e2b44989a6b0f
562577fd757
e686a6e3b9598c588202794f7670c2356e7bc80ecb69113eb306
2ae4b57e7396
e9fefd053b8c77c7db13d528b97d2b974dfd86775a8cc9c53b8efd

Black Basta  
ransomware

b07db8842c
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## FortiGuard Labs Guidance

Due to the ease of disruption, damage to daily operations, potential impact to an organization's reputation, and the unwanted destruction or release of personally identifiable information (PII), etc., it is vital to keep all AV and IPS signatures up to date.

Since the majority of ransomware is delivered via phishing, organizations should consider leveraging Fortinet solutions designed to train users to understand and detect phishing threats:

- The **FortiPhish Phishing Simulation Service** uses real-world simulations to help organizations test user awareness and vigilance to phishing threats and to train and reinforce proper practices when users encounter targeted phishing attacks.
- Our FREE **NSE training: NSE 1 – Information Security Awareness** includes a module on internet threats designed to help end users learn how to identify and protect themselves from various types of phishing attacks and can be easily added to internal training programs.

Organizations will need to make foundational changes to the frequency, location, and security of their data backups to effectively deal with the evolving and rapidly expanding risk of ransomware. When coupled with digital supply chain compromise and

a workforce telecommuting into the network, there is a real risk that attacks can come from anywhere. Cloud-based security solutions, such as **SASE**, to protect off-network devices; advanced endpoint security, such as **EDR** (endpoint detection and response) solutions that can disrupt malware mid-attack; and **Zero Trust Access** and network segmentation strategies that restrict access to applications and resources based on policy and context, should all be investigated to minimize risk and to reduce the impact of a successful ransomware attack.

As part of the industry's leading fully integrated **Security Fabric**, delivering native synergy and automation across your security ecosystem, Fortinet also provides an extensive portfolio of technology and human-based as-a-service offerings. These services are powered by our global FortiGuard team of seasoned cybersecurity experts.

## Best Practices include Not Paying a Ransom

Organizations such as CISA, NCSC, the **FBI**, and HHS caution ransomware victims against paying a ransom partly because the payment does not guarantee that files will be recovered. According to a **U.S. Department of Treasury's Office of Foreign Assets Control (OFAC) advisory**, ransom payments may also embolden adversaries to target additional organizations, encourage other criminal actors to distribute ransomware, and/or fund illicit activities that could potentially be illegal. For organizations and individuals affected by ransomware, the FBI has a Ransomware Complaint **page** where victims can submit samples of ransomware activity via their Internet Crimes Complaint Center (IC3).

## How Fortinet Can Help

FortiGuard Labs' **Emergency Incident Response Service** provides rapid and effective response when an incident is detected. And our **Incident Readiness Subscription Service** provides tools and guidance to help you better prepare for a cyber incident through readiness assessments, IR playbook development, and IR playbook testing (tabletop exercises).

*Learn more about Fortinet's **FortiGuard Labs** threat research and intelligence organization and the FortiGuard AI-powered security **services portfolio**.*

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