

The five-day job: A BlackByte ransomware intrusion case study | Microsoft Security Blog

By Microsoft Incident Response

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As ransomware attacks continue to grow in number and sophistication, threat actors can quickly impact business operations if organizations are not well prepared. In a recent investigation by Microsoft Incident Response (previously known as Microsoft Detection and Response Team – DART) of an intrusion, we found that the threat actor progressed through the full attack chain, from initial access to impact, in less than five days, causing significant business disruption for the victim organization.

Our investigation found that within those five days, the threat actor employed a range of tools and techniques, culminating in the deployment of BlackByte 2.0 ransomware, to achieve their objectives. These techniques included:

- Exploitation of unpatched internet-exposed Microsoft Exchange Servers
- Web shell deployment facilitating remote access
- Use of living-off-the-land tools for persistence and reconnaissance
- Deployment of Cobalt Strike beacons for command and control (C2)
- Process hollowing and the use of vulnerable drivers for defense evasion
- Deployment of custom-developed backdoors to facilitate persistence
- Deployment of a custom-developed data collection and exfiltration tool

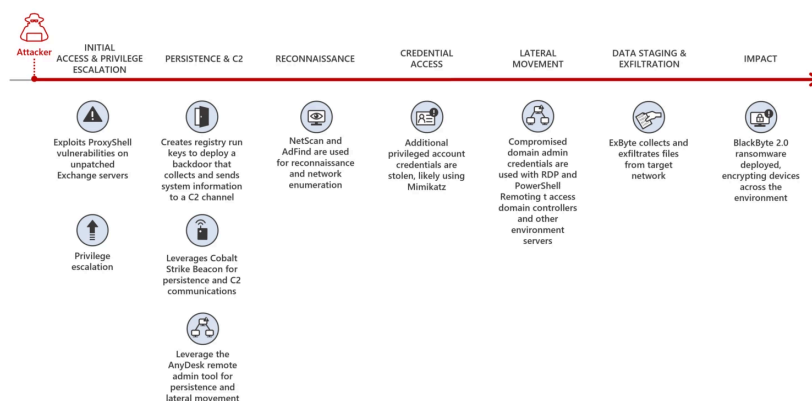


Figure 1. BlackByte 2.0 ransomware attack chain

In this blog, we share details of our investigation into the end-to-end attack chain, exposing security weaknesses that the threat actor exploited to advance their attack. As we learned from Microsoft’s tracking of ransomware attacks and the [cybercriminal economy](#) that enables them, disrupting common attack patterns could stop many of the attacker activities that precede ransomware deployment. This case highlights that common security hygiene practices go a long way in preventing, identifying, and responding to malicious activity as early as possible to mitigate the impact of ransomware attacks. We encourage organizations to follow the outlined mitigation steps, including ensuring that internet-facing assets are up to date and configured securely. We also share indicators of compromise, detection details, and hunting guidance to help organizations identify and respond to these attacks in their environments.

Forensic analysis

Initial access and privilege escalation

To obtain initial access into the victim’s environment, the threat actor was observed exploiting the [ProxyShell vulnerabilities](#) CVE-2021-34473, CVE-2021-34523, and CVE-2021-31207 on unpatched Microsoft Exchange Servers. The exploitation of these vulnerabilities allowed the threat actor to:

- Attain system-level privileges on the compromised Exchange host
- Enumerate LegacyDN of users by sending Autodiscover requests, including SIDs of users
- Construct a valid authentication token and use it against the Exchange PowerShell backend
- Impersonate domain admin users and create a web shell by using the *New-MailboxExportRequest* cmdlet
- Create web shells to obtain remote control on affected servers

The threat actor was observed operating from the following IP to exploit ProxyShell and access the web shell:

- 185.225.73[.]244

Persistence

Backdoor

After gaining access to a device, the threat actor created the following registry run keys to run a payload each time a user signs in:

Registry key	Value name	Value data
HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Run	MsEdgeMsE	rundll32 C:\Users\user\Downloads\api-msvc.dll,Default
HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Run	MsEdgeMsE	rundll32 C:\temp\api-msvc.dll,Default
HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Run	MsEdgeMsE	rundll32 C:\systemtest\api-system.png,Default

The file *api-msvc.dll* (SHA-256: 4a066569113a569a6feb8f44257ac8764ee8f2011765009fd82fe3f4b92d3e) was determined to be a backdoor capable of collecting system information, such as the installed antivirus products, device name, and IP address. This information is then sent via HTTP POST request to the following C2 channel:

- `hxxps://myvisit[.]jateksecurity[.]org/t`

The organization was not using Microsoft Defender Antivirus, which detects this malware as Trojan:Win32/Kovter!MSR, as the primary antivirus solution, and the backdoor was allowed to run.

An additional file, *api-system.png*, was identified to have similarities to *api-msvc.dll*. This file behaved like a DLL, had the same default export function, and also leveraged run keys for persistence.

Cobalt Strike Beacon

The threat actor leveraged Cobalt Strike to achieve persistence. The file *sys.exe* (SHA-256: 5f37b85687780c089607670040dbb3da2749b91b8adc0aa411fd6280b5fa7103), detected by Microsoft Defender Antivirus as Trojan:Win64/CobaltStrike!MSR, was determined to be a Cobalt Strike Beacon and was downloaded directly from the file sharing service *temp[.]jsh*:

- `hxxps://temp[.]jsh/szAyn/sys.exe`

This beacon was configured to communicate with the following C2 channel:

- 109.206.243[.]59:443

AnyDesk

Threat actors leverage legitimate remote access tools during intrusions to blend into a victim network. In this case, the threat actor utilized the remote administration tool AnyDesk, to maintain persistence and move laterally within the network. AnyDesk was installed as a service and was run from the following paths:

- `C:\systemtest\anydesk\AnyDesk.exe`
- `C:\Program Files (x86)\AnyDesk\AnyDesk.exe`
- `C:\Scripts\AnyDesk.exe`

Successful connections were observed in the AnyDesk log file *ad_svc.trace* involving anonymizer service IP addresses linked to TOR and MULLVAD VPN, a common technique that threat actors employ to obscure their source IP ranges.

Reconnaissance

We found the presence and execution of the network discovery tool NetScan being used by the threat actor to perform network enumeration using the following file names:

- *netscan.exe* (SHA-256:1b9badb1c646a19cdf101ac4f6fdd23bc61eaab8c9f925eb41848cea9fd0738e)
- *netapp.exe* (SHA-256:1b9badb1c646a19cdf101ac4f6fdd23bc61eaab8c9f925eb41848cea9fd0738e)

Additionally, execution of AdFind (SHA-256: f157090fd3ccd4220298c06ce8734361b724d80459592b10ac632acc624f455e), an Active Directory reconnaissance tool, was

observed in the environment.

Credential access

Evidence of likely usage of the credential theft tool Mimikatz was also uncovered through the presence of a related log file *mimikatz.log*. Microsoft IR assesses that Mimikatz was likely used to attain credentials for privileged accounts.

Lateral movement

Using compromised domain admin credentials, the threat actor used Remote Desktop Protocol (RDP) and PowerShell remoting to obtain access to other servers in the environment, including domain controllers.

Data staging and exfiltration

In one server where Microsoft Defender Antivirus was installed, a suspicious file named *explorer.exe* was identified, detected as Trojan:Win64/WinGoObfusc.LK!MT, and quarantined. However, because tamper protection wasn't enabled on this server, the threat actor was able to disable the Microsoft Defender Antivirus service, enabling the threat actor to run the file using the following command:

```
explorer.exe P@$w0rd
```

After reverse engineering *explorer.exe*, we determined it to be ExByte, a GoLang-based tool developed and commonly used in BlackByte ransomware attacks for collection and exfiltration of files from victim networks. This tool is capable of enumerating files of interest across the network and, upon execution, creates a log file containing a list of files and associated metadata. Multiple log files were uncovered during the investigation in the path:

- *C:\ExchangeMSExchLog.log*

Analysis of the binary revealed a list of file extensions that are targeted for enumeration.

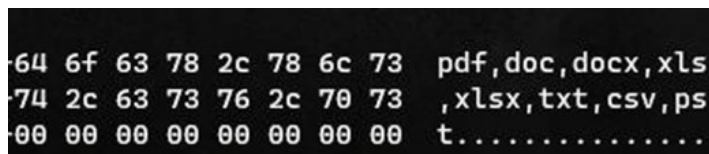


Figure 2. Binary analysis showing file extensions enumerated by *explorer.exe*

Forensic analysis identified a file named *data.txt* that was created and later deleted after ExByte execution. This file contained obfuscated credentials that ExByte leveraged to authenticate to the popular file sharing platform Mega NZ using the platform's API at:

- *hxps://g.api.mega.co.[nz]*

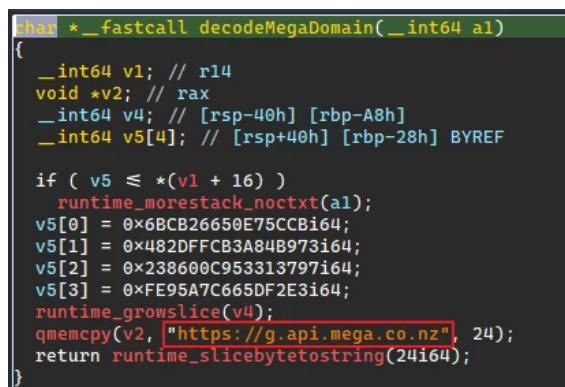


Figure 3. Binary analysis showing *explorer.exe* functionality for connecting to file sharing service MEGA NZ

We also determined that this version of Exbyte was crafted specifically for the victim, as it contained a hardcoded device name belonging to the victim and an internal IP address.

ExByte execution flow

Upon execution, ExByte decodes several strings and checks if the process is running with privileged access by reading *\.PHYSICALDRIVE0*:

- If this check fails, *ShellExecuteW* is invoked with the *IpOperation* parameter *RunAs*, which runs *explorer.exe* with elevated privileges.

After this access check, *explorer.exe* attempts to read the *data.txt* file in the current location:

- If the text file doesn't exist, it invokes a command for self-deletion and exits from memory:

```
C:\Windows\system32\cmd.exe /c ping 1.1.1.1 -n 10 > nul & Del <path>explorer.exe /F /Q
```

```
</path>
```

- If *data.txt* exists, *explorer.exe* reads the file, passes the buffer to Base64 decode function, and then decrypts the data using the key provided in the command line. The decrypted data is then parsed as JSON below and fed for login function:

```
{
```

```
  "a": "us0",
```

```
  "user": "<content from=" data.txt=">"
```

```
}
```

```
</content>
```

Finally, it forms a URL for sign-in to the API of the service MEGA NZ:

- `hxxps://g.api.mega.co[.]nz/cs?id=1674017543`

Data encryption and destruction

On devices where files were successfully encrypted, we identified suspicious executables, detected by Microsoft Defender Antivirus as Trojan:Win64/BlackByte!MSR, with the following names:

- *wEFT.exe*
- *schillerized.exe*

The files were analyzed and determined to be BlackByte 2.0 binaries responsible for encryption across the environment. The binaries require an 8-digit key number to encrypt files.

Two modes of execution were identified:

- When the `-s` parameter is provided, the ransomware self-deletes and encrypts the machine it was executed on.
- When the `-a` parameter is provided, the ransomware conducts enumeration and uses an Ultimate Packer Executable (UPX) packed version of PsExec to deploy across the network. Several domain admin credentials were hardcoded in the binary, facilitating the deployment of the binary across the network.

Depending on the switch (`-s` or `-a`), execution may create the following files:

- *C:\SystemData\M8yl89s7.exe* (UPX-packed PsExec with a random name; SHA-256: `ba3ec3f445683d0d0407157fda0c26fd669c0b8cc03f21770285a20b3133098f`)
- *C:\SystemData\wEFT.exe* (Additional BlackByte binary)
- *C:\SystemData\MsExchangeLog1.log* (Log file)
- *C:\SystemData\rENEGotiAtES* (A vulnerable (CVE-2019-16098) driver *RtCore64.sys* used to evade detection by installed antivirus software; SHA-256: `01aa278b07b58dc46c84bd0b1b5c8e9ee4e62ea0bf7a695862444af32e87f1fd`)
- *C:\SystemData\Hu6c4.ico* (Random name – BlackBytes icon)
- *C:\SystemData\BB_Readme_file.txt* (BlackByte ReadMe file)
- *C:\SystemData\skip_bypass.txt* (Unknown)

BlackByte 2.0 ransomware capabilities

Some capabilities identified for the BlackByte 2.0 ransomware were:

- Antivirus bypass
 - The file *rENEGotiAtES* created matches *RTCore64.sys*, a vulnerable driver (CVE-2049-16098) that allows any authenticated user to read or write to arbitrary memory
 - The BlackByte binary then creates and starts a service named *RABAsSaa* calling *rENEGotiAtES*, and exploits this service to evade detection by installed antivirus software
- Process hollowing
 - Invokes *svchost.exe*, injects to it to complete device encryption, and self-deletes by executing the following command:
 - `cmd.exe /c ping 1.1.1.1 -n 10 > nul & Del "PATH_TO_BLACKBYTE" /F /Q`
- Modification / disabling of Windows Firewall

- The following commands are executed to either modify existing Windows Firewall rules, or to disable Windows Firewall entirely:
 - `cmd /c netsh advfirewall set allprofiles state off`
 - - `cmd /c netsh advfirewall firewall set rule group="File and Printer Sharing" new enable=Yes`
 - `cmd /c netsh advfirewall firewall set rule group="Network Discovery" new enable=Yes`
- Modification of volume shadow copies
 - The following commands are executed to destroy volume shadow copies on the machine:
 - `cmd /c vssadmin Resize ShadowStorage /For=B: /On=B: /MaxSize=401MB`
 - `cmd /c vssadmin Resize ShadowStorage /For=B: /On=B: /MaxSize=UNBOUNDED`
- Modification of registry keys/values
 - The following commands are executed to modify the registry, facilitating elevated execution on the device:
 - `cmd /c reg add HKLMSOFTWAREMicrosoftWindowsCurrentVersionPoliciesSystem /v LocalAccountTokenFilterPolicy /t REG_DWORD /d 1 /f`
 - - `cmd /c reg add HKLMSOFTWAREMicrosoftWindowsCurrentVersionPoliciesSystem /v EnableLinkedConnections /t REG_DWORD /d 1 /f`
 - `cmd /c reg add HKLM\SYSTEM\CurrentControlSet\Control\FileSystem /v LongPathsEnabled /t REG_DWORD /d 1 /f`
- Additional functionality
 - Ability to terminate running services and processes
 - Ability to enumerate and mount volumes and network shares for encryption
 - Perform anti-forensics technique timestomping (sets the file time of encrypted and ReadMe file to 2000-01-01 00:00:00)
 - Ability to perform anti-debugging techniques

Recommendations

To guard against BlackByte ransomware attacks, Microsoft recommends the following:

- Ensure that you have a patch management process in place and that patching for internet-exposed devices is prioritized; Understand and assess your cyber exposure with advanced vulnerability and configuration assessment tools like [Microsoft Defender Vulnerability Management](#)
- Implement an endpoint detection and response (EDR) solution like [Microsoft Defender for Endpoint](#) to gain visibility into malicious activity in real time across your network
- Ensure antivirus protections are updated regularly by [turning on cloud-based protection](#) and that your antivirus solution is configured to block threats
- Enable [tamper protection](#) to prevent components of Microsoft Defender Antivirus from being disabled
- Block inbound traffic from IPs specified in the indicators of compromise section of this report
- Block inbound traffic from TOR exit nodes
- Block inbound access from unauthorized public VPN services
- Restrict administrative privileges to prevent authorized system changes

Conclusion

BlackByte ransomware attacks target organizations that have infrastructure with unpatched vulnerabilities. As outlined in the [Microsoft Digital Defense Report](#), common security hygiene practices, including keeping systems up to date, could protect against 98% of attacks.

As new tools are being developed by threat actors, a modern threat protection solution like Microsoft 365 Defender is necessary to prevent and detect the multiple techniques used in the attack chain, especially where the threat actor attempts to evade or disable specific defense mechanisms. Hunting for malicious behavior should be performed regularly in order to detect potential attacks that could evade detections, as a complementary activity for continuous monitoring from security tools alerts and incidents.

To understand how Microsoft can help you secure your network and respond to network compromise, visit <https://aka.ms/MicrosoftIR>.

Microsoft 365 Defender detections

Microsoft 365 Defender is becoming Microsoft Defender XDR. [Learn more.](#)

Microsoft Defender Antivirus

Microsoft Defender Antivirus detects this threat as the following malware:

- Trojan:Win32/Kovter!MSR
- Trojan:Win64/WinGoObfusc.LK!MT

- Trojan:Win64/BlackByte!MSR
- HackTool:Win32/AdFind!MSR
- Trojan:Win64/CobaltStrike!MSR

Microsoft Defender for Endpoint

The following alerts might indicate threat activity related to this threat. Note, however, that these alerts can be also triggered by unrelated threat activity.

- 'CVE-2021-31207' exploit malware was detected
- An active 'NetShDisableFireWall' malware in a command line was prevented from executing.
- Suspicious registry modification.
- 'Rtcore64' hacktool was detected
- Possible ongoing hands-on-keyboard activity (Cobalt Strike)
- A file or network connection related to a ransomware-linked emerging threat activity group detected
- Suspicious sequence of exploration activities
- A process was injected with potentially malicious code
- Suspicious behavior by cmd.exe was observed
- 'Blackbyte' ransomware was detected

Microsoft Defender Vulnerability Management

Microsoft Defender Vulnerability Management surfaces devices that may be affected by the following vulnerabilities used in this threat:

- CVE-2021-34473
- CVE-2021-34523
- CVE-2021-31207
- CVE-2019-16098

Hunting queries

Microsoft 365 Defender

Microsoft 365 Defender customers can run the following query to find related activity in their networks:

ProxyShell web shell creation events

```
DeviceProcessEvents  
  
| where ProcessCommandLine has_any ("ExcludeDumpster","New-ExchangeCertificate") and ProcessCommandLine  
has_any ("-RequestFile","-FilePath")
```

Suspicious vssadmin events

```
DeviceProcessEvents  
  
| where ProcessCommandLine has_any ("vssadmin","vssadmin.exe") and ProcessCommandLine has "Resize  
ShadowStorage" and ProcessCommandLine has_any ("MaxSize=401MB","MaxSize=UNBOUNDED")
```

Detection for persistence creation using Registry Run keys

```
DeviceRegistryEvents  
  
| where ActionType == "RegistryValueSet"  
  
| where (RegistryKey has @"MicrosoftWindowsCurrentVersionRunOnce" and RegistryValueName == "MsEdgeMsE")  
  
or (RegistryKey has @"MicrosoftWindowsCurrentVersionRunOnceEx" and RegistryValueName == "MsEdgeMsE")  
  
or (RegistryKey has @"MicrosoftWindowsCurrentVersionRun" and RegistryValueName == "MsEdgeMsE")  
  
| where RegistryValueData startswith @"rundll32"  
  
| where RegistryValueData endswith @".dll,Default"  
  
| project Timestamp,DeviceId,DeviceName,ActionType,RegistryKey,RegistryValueName,RegistryValueData
```

Microsoft Sentinel

Microsoft Sentinel customers can use the TI Mapping analytics (a series of analytics all prefixed with 'TI map') to automatically match the malicious domain indicators mentioned in this blog post with data in their workspace. If the TI Map

analytics are not currently deployed, customers can install the Threat Intelligence solution from the Microsoft Sentinel Content Hub to have the analytics rule deployed in their Sentinel workspace. More details on the Content Hub can be found here: <https://learn.microsoft.com/azure/sentinel/sentinel-solutions-deploy>

Microsoft Sentinel also has a range of detection and threat hunting content that customers can use to detect the post exploitation activity detailed in this blog in addition to Microsoft 365 Defender detections list above.

- [ProxyShell](#)
- [Web shell activity](#)
- [Suspicious file downloads on Exchange Servers](#)
- [Firewall rule changes](#)
- [Shadow copy deletion](#)
- [Anamolous RDP activity](#)

Indicators of compromise

The table below shows IOCs observed during our investigation. We encourage our customers to investigate these indicators in their environments and implement detections and protections to identify past related activity and prevent future attacks against their systems.

Indicator	Type	Description
4a066569113a569a6feb8f44257ac8764ee8f2011765009fd82fe3f4b92d3e	SHA-256	api-msvc.dll (Backdoor installed through RunKeys)
5f37b85687780c089607670040dbb3da2749b91b8adc0aa411fd6280b5fa7103	SHA-256	sys.exe (Cobalt Strike Beacon)
01aa278b07b58dc46c84bd0b1b5c8e9ee4e62ea0bf7a695862444af32e87f1fd	SHA-256	rENEGotiAtES (Vulnerable driver RtCore64.sys created by BlackByte binary)
ba3ec3f445683d0d0407157fda0c26fd669c0b8cc03f21770285a20b3133098f	SHA-256	[RANDOM_NAME].exe (UPX Packed PsExec created by BlackByte binary)
1b9badb1c646a19cdf101ac4f6fdd23bc61eaab8c9f925eb41848cea9fd0738e	SHA-256	"netscan.exe", "netapp.exe (Netscan network discovery tool)
f157090fd3ccd4220298c06ce8734361b724d80459592b10ac632acc624f455e	SHA-256	AdFind.exe (Active Directory information gathering tool)
hxxps://myvisit[.]jalteksecurity[.]org/t	URL	C2 for backdoor api-msvc.dll
hxxps://temp[.]sh/szAyn/sys.exe	URL	Download URL for sys.exe
109.206.243[.]59	IP Address	C2 for Cobalt Strike Beacon sys.exe
185.225.73[.]244	IP Address	Originating IP address for ProxyShell exploitation and web shell interaction

NOTE: These indicators should not be considered exhaustive for this observed activity.

Appendix

File extensions targeted by BlackByte binary for encryption:

.4dd	.4dl	.accdb	.accdc	.accde	.accdr	.accdt	.accft
------	------	--------	--------	--------	--------	--------	--------

.adb	.ade	.adf	.adp	.arc	.ora	.alf	.ask
.btr	.bdf	.cat	.cdb	.ckp	.cma	.cpd	.daccpac
.dad	.dadiagrams	.daschema	.db	.db-shm	.db-wal	.db3	.dbc
.dbf	.dbs	.dbt	.dbv	.dbx	.dcb	.dct	.dcx
.ddl	.dlis	.dp1	.dqy	.dsk	.dsn	.dtsx	.dxl
.eco	.ecx	.edb	.epim	.exb	.fcd	.fdb	.fic
.fmp	.fmp12	.fmpl	.fol	.fp3	.fp4	.fp5	.fp7
.fpt	.frm	.gdb	.grdb	.gwi	.hdb	.his	.ib
.idb	.ihx	.itdb	.itw	.jet	.jtx	.kdb	.kexi
.kexic	.kexis	.lgc	.lwx	.maf	.maq	.mar	.masmav
.mdb	.mpd	.mrg	.mud	.mwb	.myd	.ndf	.nnt
.nrmlib	.ns2	.ns3	.ns4	.nsf	.nv	.nv2	.nwdb
.nyf	.odb	.ogy	.orx	.owc	.p96	.p97	.pan
.pdb	.pdm	.pnz	.qry	.qvd	.rbf	.rctd	.rod
.rodx	.rpd	.rsd	.sas7bdat	.sbf	.scx	.sdb	.sdc
.sdf	.sis	.spg	.sql	.sqlite	.sqlite3	.sqlitedb	.te
.temx	.tmd	.tps	.trc	.trm	.udb	.udl	.usr
.v12	.vis	.vpd	.vvv	.wdb	.wmdb	.wrk	.xdb
.xld	.xmlff	.abddb	.abs	.abx	.accdw	.and	.db2
.fm5	.hjt	.icg	.icr	.kdb	.lut	.maw	.mdn
.mdt							

Shared folders targeted for encryption (Example: \\[IP address]Downloads):

Users	Backup	Veeam	homes	home
media	common	Storage Server	Public	Web
Images	Downloads	BackupData	ActiveBackupForBusiness	Backups
NAS-DC	DCBACKUP	DirectorFiles	share	

File extensions ignored:

.ini	.url	.msilog	.log	.ldf	.lock	.theme	.msi
.sys	.wpx	.cpl	.adv	.msc	.scr	.key	.ico
.dll	.hta	.deskthemepack	.nomedia	.msu	.rtp	.msp	.idx
.ani	.386	.diagcfg	.bin	.mod	.ics	.com	.hlp
.spl	.nls	.cab	.exe	.diagpkg	.icl	.ocx	.rom
.prf	.themepack	.msstyles	.icns	.mpa	.drv	.cur	.diagcab
.cmd	.shs						

Folders ignored:

windows	boot	program files (x86)	windows.old	programdata
intel	bitdefender	trend micro	windowsapps	appdata
application data	system volume information	perflogs	msocache	

Files ignored:

bootnxt	ntldr	bootmgr	thumbs.db
ntuser.dat	bootsect.bak	autoexec.bat	iconcache.db
bootfont.bin			

Processes terminated:

teracopy	teamviewer	nsservice	nsctrl	uranium
processhacker	procmon	pestudio	procmon64	x32dbg
x64dbg	cff explorer	procexp	pslist	tcpview
tcpvcon	dbgview	rammap	rammap64	vmmap
ollydbg	autoruns	autorunssc	filemon	regmon
idaq	idaq64	immunitydebugger	wireshark	dumpcap
hookexplorer	importrec	petools	lordpe	sysinspector
proc_analyzer	sysanalyzer	sniff_hit	windbg	joeboxcontrol
joeboxserver	resourcehacker	fiddler	httpdebugger	dumpit
rammap	rammap64	vmmap	agntsvc	cntaosmgr
dbeng50	dbsnmp	encsvc	infopath	isqlplussvc
mbamtray	msaccess	msftesql	msspub	mydesktoppqos
mydesktopservice	mysqld	mysqld-nt	mysqld-opt	Nrtscan
ocautoupds	ocomm	ocssd	onenote	oracle
outlook	PccNTMon	powerpnt	sqbcoreservice	sql
sqlagent	sqlbrowser	sqlservr	sqlwriter	steam
synctime	tbirdconfig	thebat	thebat64	thunderbird
tmlisten	visio	winword	wordpad	xfssvcon
zoolz				

Services terminated:

CybereasonRansomFree	vnetd	bpcd	SamSs	TeraCopyService
msftesql	nsService	klvssbridge64	vapiendpoint	ShMonitor
Smcinst	SmcService	SntpService	svcGenericHost	Swi_
TmCCSF	tmlisten	TrueKey	TrueKeyScheduler	TrueKeyServiceHelper
WRSVC	McTaskManager	OracleClientCache80	mfefire	wbengine
mfemms	RESvc	mfevtp	sacsrv	SAVAdminService
SepMasterService	PDVFSService	ESHASRV	SDRSVC	FA_Scheduler
KAVFS	KAVFS_KAVFSGT	kavfssl	klnagent	macmnsvc
masvc	MBAMService	MBEndpointAgent	McShield	audioendpointbuilder
Antivirus	AVP	DCAgent	bedbg	EhttpSrv
MMS	ekrn	EPSecurityService	EPUUpdateService	nrtscan
EsgShKernel	msexchangeadtopology	AcrSch2Svc	MSOLAP\$TPSAMA	Intel(R) PROSet Monitoring
msexchangeimap4	ARSM	unistoresvc_1af40a	ReportServer\$TPS	MSOLAP\$SYSTEM_B

W3Svc	MSEExchangeSRS	ReportServer\$TPSAMA	Zoolz 2 Service	MSOLAP\$TPS
aphidmonitorservice	SstpSvc	MSEExchangeMTA	ReportServer\$SYSTEM_BGC	Symantec System Recovery
UI0Detect	MSEExchangeSA	MSEExchangeIS	ReportServer	MsDtsServer110
POP3Svc	MSEExchangeMGMT	SMTPSvc	MsDtsServer	IisAdmin
MSEExchangeES	EraserSvc11710	Enterprise Client Service	MsDtsServer100	NetMsmqActivator
stc_raw_agent	VSNAPVSS	PDFVSService	AcrSch2Svc	Acronis
CASAD2DWebSvc	CAARCUUpdateSvc	McAfee	avpsus	DLPAGENTService
mfewc	BMR Boot Service	DefWatch	ccEvtMgr	ccSetMgr
SavRoam	RTVsc screenconnect	ransom	sqltelemetry	msexch
vnc	teamviewer	msolap	veeam	backup
sql	mementas	vss	sophos	svc\$
mepocs	wuauerv			

Drivers that Blackbyte can bypass:

360avflt.sys	360box.sys	360fsflt.sys	360qpesv.sys	5nine.cb
a2acc.sys	a2acc64.sys	a2ertpx64.sys	a2ertpx86.sys	a2gffi64.
a2gffx64.sys	a2gffx86.sys	aaf.sys	aalprotect.sys	abrpmo
accessvalidator.sys	acdriver.sys	acdrv.sys	adapivaclientcache32.sys	adapiva
adcvcnt.sys	adspiderdoc.sys	aefilter.sys	agentrtm64.sys	agfsmon
agseclock.sys	agsyslock.sys	ahkamflt.sys	ahksvpro.sys	ahkushfv
ahnrglh.sys	aictracedrv_am.sys	airship-filter.sys	ajfsprot.sys	alcapture
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