

#StopRansomware: Zeppelin Ransomware

SUMMARY

Note: this joint Cybersecurity Advisory (CSA) is part of an ongoing #StopRansomware effort to publish advisories for network defenders that detail various ransomware variants and ransomware threat actors. These #StopRansomware advisories include recently and historically observed tactics, techniques, and procedures (TTPs) and indicators of compromise (IOCs) to help organizations protect against ransomware. Visit stopransomware.gov to see all #StopRansomware advisories and to learn more about other ransomware threats and no-cost resources.

Actions to take today to mitigate cyber threats from ransomware:

- Prioritize remediating [known exploited vulnerabilities](#).
- Train users to recognize and report phishing attempts.
- Enable and enforce multifactor authentication.

The Federal Bureau of Investigation (FBI) and the Cybersecurity and Infrastructure Security Agency (CISA) are releasing this joint CSA to disseminate known Zeppelin ransomware IOCs and TTPs associated with ransomware variants identified through FBI investigations as recently as 21 June 2022.

The FBI and CISA encourage organizations to implement the recommendations in the Mitigations section of this CSA to reduce the likelihood and impact of ransomware incidents.

TECHNICAL DETAILS

Note: this advisory uses the MITRE ATT&CK[®] for Enterprise framework, version 11. See [MITRE ATT&CK for Enterprise](#) for all referenced tactics and techniques.

Zeppelin ransomware is a derivative of the Delphi-based Vega malware family and functions as a Ransomware as a Service (RaaS). From 2019 through at least June 2022, actors have used this malware to target a wide range of businesses and critical infrastructure organizations, including defense contractors, educational institutions, manufacturers, technology companies, and especially organizations in the healthcare and medical industries. Zeppelin actors have been known to request ransom payments in Bitcoin, with initial amounts ranging from several thousand dollars to over a million dollars.

To report suspicious or criminal activity related to information found in this Joint Cybersecurity Advisory, contact your local FBI field office at fbi.gov/contact-us/field-offices. When available, please include the following information regarding the incident: date, time, and location of the incident; type of activity; number of people affected; type of equipment used for the activity; the name of the submitting company or organization; and a designated point of contact. To request incident response resources or technical assistance related to these threats, contact CISA at Report@cisa.dhs.gov.

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Zeppelin actors gain access to victim networks via RDP exploitation [T1133], exploiting SonicWall firewall vulnerabilities [T1190], and phishing campaigns [T1566]. Prior to deploying Zeppelin ransomware, actors spend one to two weeks mapping or enumerating the victim network to identify data enclaves, including cloud storage and network backups [TA0007]. Zeppelin actors can deploy Zeppelin ransomware as a .dll or .exe file or contained within a PowerShell loader. [1]

Prior to encryption, Zeppelin actors exfiltrate [TA0010] sensitive company data files to sell or publish in the event the victim refuses to pay the ransom. Once the ransomware is executed, a randomized nine-digit hexadecimal number is appended to each encrypted file as a file extension, e.g., file.txt.txt.C59-E0C-929 [T1486]. A note file with a ransom note is left on compromised systems, frequently on the desktop (see figure 1 below).



Figure 1: Sample Ransom Note

The FBI has observed instances where Zeppelin actors executed their malware multiple times within a victim's network, resulting in the creation of different IDs or file extensions, for each instance of an attack; this results in the victim needing several unique decryption keys.

Indicators of Compromise (IOC)

See table 1 below for IOCs as of June 2022 obtained from FBI incident response investigations.

Table 1: File Hashes as of June 2022

MD5	SHA1	SHA256
981526650af8d6f8f20 177a26abb513a	4fee2cb5c98abbe556e9c7c cfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30 381b80b846f2e3fe5a0d2df21d
c25d45e9bbfea29cb6 d9ee0d9bf2864d	eaeff8d315cca71e997063a 2baec5cc73fad9453	a42185d506e08160cb96c81801fbe173fb07 1f4a2f284830580541e057f4423b
183b6b0c90c1e0276 a2015752344a4cf	1cb5e8132302b420af9b1e 5f333c507d8b2a2441	aa7e2d63fc991990958dfb795a0aed254149f 185f403231eaebe35147f4b5ebe
9349e1cc3de7c7f689 3a21bd6c3c4a6b	db398e38ee6221df7e4aa4 9d8f96799cca4d87e1	a2a9385cbbcfacc2d541f5bd92c38b0376b1 5002901b2fd1cc62859e161a8037
c8f75487d0d496a374 6e6c81a5ecc6dc	4b91a91a98a2f0128c80f8c eeef0f5d293adf0cd	54d567812eca7fc5f2ff566e7fb8a93618b6d2 357ce71776238e0b94d55172b1
477eedb422041385e 59a4fff72cb97c1	9892cc90e6712d3548e45f3 4f14f362bccedf0be	fb59f163a2372d09cd0fc75341d3972fdd308 7d2d507961303656b1d791b17c6
5841ef35aaff08bb03d 25e5afe3856a2	ffd228b0d7afe7cab4e9734f 7093e7ba01c5a06e	1e3c5a0aa079f8dfcc49cdca82891ab78d01 6a919d9810120b79c5deb332f388
d6c4b253ab1d169cf3 12fec12cc9a28f	0f47c279fea1423c7a0e7bc 967d9ff3fae7a0de8	347f14497df4df73bc414f4e852c5490b12db 991a4b3811712bac7476a3f1bc9
fba7180ad49d6a7f3c 60c890e2784704	f561f9e3c949fe87f12dbfa1 66ffb2eb85712419	7d8c4c742689c097ac861fcbf7734709fd7dc ab1f7ef2ceffb4b0b7dec109f55
bc6c991941d9afbd52 2fa0a2a248a97a	a243ce234fc8294e2e2e526 418b4eaadc2d6c84f	37c320983ae4c1fd0897736a53e5b0481edb 1d1d91b366f047aa024b0fc0a86e
f3490951ae51922cb3 60a3d76a670159	e2cb60be111716e32db7ca 2365ad6e73c30f0e21	894b03ed203cfa712a28ec472efec0ca9a55 d6058115970fe7d1697a3ddb0072
e4f1f05c2e6c3fc2f333 6a8c8799ffb4	dbd9fcf2b05e703d34181c4 6f4c22392b9fcc1da	307877881957a297e41d75c84e9a965f1cd0 7ac9d026314dcaff55c4da23d03e
aa2048271f0aef3383 480ce4a7c93b52	512b16ea74027fa4d00558 31de5e51278812c8de	bafd3434f3ba5bb9685e239762281d4c7504 de7e0cfd9d6394e4a85b4882ff5d
f66b738e1bfe1f8aab5 10abed850c424	571f50fee0acad1da39fe06c 75116461800cc719	faa79c796c27b11c4f007023e50509662eac 4bca99a71b26a9122c260abfb3c6

MD5	SHA1	SHA256
981526650af8d6f8f20 177a26abb513a	4fee2cb5c98abbe556e9c7c cfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30 381b80b846f2e3fe5a0d2df21d
c25d45e9bbfea29cb6 d9ee0d9bf2864d	eaeff8d315cca71e997063a 2baec5cc73fad9453	a42185d506e08160cb96c81801fbe173fb07 1f4a2f284830580541e057f4423b
183b6b0c90c1e0276 a2015752344a4cf	1cb5e8132302b420af9b1e 5f333c507d8b2a2441	aa7e2d63fc991990958dfb795a0aed254149f 185f403231eaebe35147f4b5ebe
9349e1cc3de7c7f689 3a21bd6c3c4a6b	db398e38ee6221df7e4aa4 9d8f96799cca4d87e1	a2a9385cbbcfacc2d541f5bd92c38b0376b1 5002901b2fd1cc62859e161a8037
c8f75487d0d496a374 6e6c81a5ecc6dc	4b91a91a98a2f0128c80f8c eeef0f5d293adf0cd	54d567812eca7fc5f2ff566e7fb8a93618b6d2 357ce71776238e0b94d55172b1
477eedb422041385e 59a4fff72cb97c1	9892cc90e6712d3548e45f3 4f14f362bccedf0be	fb59f163a2372d09cd0fc75341d3972fdd308 7d2d507961303656b1d791b17c6
bb30f050546f5d6e61f afc59eaf097c3	ee44179f64918f72a8d2e88 a5074d89efab3d81b	e48cf17caffc40815efb907e522475722f0599 90afc19ac516592231a783e878
78621f1e196497d440 afb57f4609fcf9	eed7c3bb3fc5181b88abeed 2204997f350324022	4a4be110d587421ad50d2b1a38b108fa05f3 14631066a2e96a1c85cc05814080
f4e0ee0200de397691 748a2cdcd7e34a	bd3f6b878284a63c72e835 4e877e3f48d6fca53c	9ef90ec912543cc24e18e73299296f14cb2c 931a5d633d4c097efa372ae59846
cf5a358a22326f09fd5 5983bb812b7d8	1addcfae4fd4211ea24202 783c2ffad6771aa34	dd89d939c941a53d6188232288a3bd73ba9 baf0b4ca6bf6ccca697d9ee42533f
7afe492a38ca6f27e2 4028aab68406b5	5870a3adbce9737319f3c94 61586d5f2afbc7adb	79d6e498e7789aaccd8caa610e8c1583626 7c6a668c322111708cf80bc38286c
1da1c0115caca5ebf0 64380eb7490041	5edb8b651c7013ebaba2eb 81c87df76a1e0724d6	b22b3625bcce7b010c0ee621434878c5f8d7 691c2a101ae248dd221a70668ac0
8c3c663ffc363d087f4 e114a79945ca	905726d178962dd1d7fe87 504d051aca440740b8	961fbc7641f04f9fed8391c387f01d64435dda 6af1164be58c4cb808b08cc910
17c5cae3bce5832dd4 2986fe612517d9	6f70e73c53d7622d8c4808a e7849133df1343484	d618c1ccd24d29e911cd3e899a4df2625155 297e80f4c5c1354bc2e79f70768c
bfe7f54f1f0640936dd 7a3384608b1f6	9436ccee41c01ca3cb4db5 5c10884615aba76d19	8170612574f914eec9e66902767b834432a7 5b1d6ae510f77546af2a291a48a2

MD5	SHA1	SHA256
981526650af8d6f8f20177a26abb513a	4fee2cb5c98abbe556e9c7c cfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30 381b80b846f2e3fe5a0d2df21d
c25d45e9bbfea29cb6d9ee0d9bf2864d	eaeff8d315cca71e997063a 2baec5cc73fad9453	a42185d506e08160cb96c81801fbe173fb07 1f4a2f284830580541e057f4423b
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9349e1cc3de7c7f6893a21bd6c3c4a6b	db398e38ee6221df7e4aa4 9d8f96799cca4d87e1	a2a9385cbbcfacc2d541f5bd92c38b0376b1 5002901b2fd1cc62859e161a8037
c8f75487d0d496a3746e6c81a5ecc6dc	4b91a91a98a2f0128c80f8c eeef0f5d293adf0cd	54d567812eca7fc5f2ff566e7fb8a93618b6d2 357ce71776238e0b94d55172b1
477eedb422041385e59a4fff72cb97c1	9892cc90e6712d3548e45f3 4f14f362bccedf0be	fb59f163a2372d09cd0fc75341d3972fdd308 7d2d507961303656b1d791b17c6
f28af04ef0370addfebfdd31f1ec25ed	cfcfa995c15d9f33de21d0dd 88d3b95d0f91d6bc	5326f52bd9a7a52759fe2fde3407dc28e8c2c aa33abf1c09c47b192a1c004c12
f3bcad5358f89df1eb0294ef53f54437	eb036759beb28f86ee981b dca4fad24152b82d8c	6bafc7e2c7edc2167db187f50106e57b49d4 a0e1b9269f1d8a40f824f2ccb42b
b1f6370582fbaf5c51e826fecef53cd7	4b2d0127699f708a8116bff 8f25c9d6140033197	f7af51f1b2b98b482885b702508bd65d3101 08a506e6d8cef3986e69f972c67d
de785ed922d4e737dc0fa0bb30a4de8b	4d280105e724db851f03de 8fc76409ef4057ff2c	bc214c74bdf6f6781f0de994750ba3c50c0e1 0d9db3483183bd47f5cef154509
7a296f7c1ac4ae8e18d4c23476735be7	c13542310f7a4e50a78247f c7334096ca09c5d7f	ed1548744db512a5502474116828f75737a ec8bb11133d5e4ad44be16aa3666b
37f18b38e1af6533d93bbb3f2ddb86dc	d3929331d9bc278dea5607 aec1574012a08de861	cf9b6dda84cbf2dbfc6edd7a740f50bddd128 842565c590d8126e5d93c024ff2
291de974e5cbe5e3d47e3d17487e027f	def93f18aaf146fe8f3c4f9a2 57364f181197608	21807d9fcaa91a0945e80d92778760e78562 68883d36139a1ad29ab91f9d983d
99d59c862a082b207a868e409ce2d97c	908a9026d61717b5fa2995 9478a9bd939da9206f	0d22d3d637930e7c26a0f16513ec438243a8 a01ea9c9d856acbcda61fcb7b499

MD5	SHA1	SHA256
981526650af8d6f8f20 177a26abb513a	4fee2cb5c98abbe556e9c7c cfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30 381b80b846f2e3fe5a0d2df21d
c25d45e9bbfea29cb6 d9ee0d9bf2864d	eaeff8d315cca71e997063a 2baec5cc73fad9453	a42185d506e08160cb96c81801fbe173fb07 1f4a2f284830580541e057f4423b
183b6b0c90c1e0276 a2015752344a4cf	1cb5e8132302b420af9b1e 5f333c507d8b2a2441	aa7e2d63fc991990958dfb795a0aed254149f 185f403231eaebe35147f4b5ebe
9349e1cc3de7c7f689 3a21bd6c3c4a6b	db398e38ee6221df7e4aa4 9d8f96799cca4d87e1	a2a9385cbbcfacc2d541f5bd92c38b0376b1 5002901b2fd1cc62859e161a8037
c8f75487d0d496a374 6e6c81a5ecc6dc	4b91a91a98a2f0128c80f8c eeef0f5d293adf0cd	54d567812eca7fc5f2ff566e7fb8a93618b6d2 357ce71776238e0b94d55172b1
477eedb422041385e 59a4fff72cb97c1	9892cc90e6712d3548e45f3 4f14f362bccedf0be	fb59f163a2372d09cd0fc75341d3972fdd308 7d2d507961303656b1d791b17c6
d27125d534e398f187 3b7f4835a79f09	1862f063c30cd02cfea6070 d3dba41ac5eee2a35	6fbfc8319ed7996761b613c18c8cb6b92a1e aed1555dae6c6b8e2594ac5fa2b9
4534f2afe5f7df1d998f 37ad4e35afeb	e2cc94e471509f9fa58620b 8bb56d77f2cfe74b0	e8596675fef4ad8378e4220c22f4358fdb4a2 0531b59d7df5382c421867520a9
7ab0676262c681b8e c15bdada17d7476	2f1803d444891abb604864 d476a8feac0d614f77	353e59e96cbf6ea6c16d06da5579d3815aaa eeefacabd7b35ba31f7b17207c5b
d7d3d23a5e796be84 4af443bda5cd67e	a9771c591f6ccc2f3419d57 1c64ab93228785771	85f9bf4d07bc2ac1891e367f077dd513d6ca0 7705bff1b648d32a7b2dc396f5
0a1cd4efda7543cec4 06a6822418daf6	af4f8d889d6a2049e7a379e a197f8cd361feb074	614cb70659ef5bb2f641f09785adc4ab5873e 0564a5303252d3c141a899253b2
23eda650479fc4908d 0ddff713508025	b1e6527c10f68586f7f1a27 9ed439d46c3f12a06	fb3e0f1e6f53ffe680d66d2143f06eb6363897 d374dc5dc63eb2f28188b8ad83
6607d8c1a28d7538e 2a6565cf40d1260	f618879c011cde344066072 949f025827feea663	594df9c402abfdc3c838d871c3395ac047f25 6b2ac2fd6ff66b371252978348d
caa7a669da39ffd8a3 a4f3419018b363	44538b7f8f065e3cef00490 89a8522a76a7fcc6	2dff3ba5c70af51ddf0ff5a322eba0746f3bf3 ae0751beb3dc0059ed3faaf3d

MD5	SHA1	SHA256
981526650af8d6f8f20 177a26abb513a	4fee2cb5c98abbe556e9c7c cfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30 381b80b846f2e3fe5a0d2df21d
c25d45e9bbfea29cb6 d9ee0d9bf2864d	eaeff8d315cca71e997063a 2baec5cc73fad9453	a42185d506e08160cb96c81801fbe173fb07 1f4a2f284830580541e057f4423b
183b6b0c90c1e0276 a2015752344a4cf	1cb5e8132302b420af9b1e 5f333c507d8b2a2441	aa7e2d63fc991990958dfb795a0aed254149f 185f403231eaebe35147f4b5ebe
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c8f75487d0d496a374 6e6c81a5ecc6dc	4b91a91a98a2f0128c80f8c eeef0f5d293adf0cd	54d567812eca7fc5f2ff566e7fb8a93618b6d2 357ce71776238e0b94d55172b1
477eedb422041385e 59a4fff72cb97c1	9892cc90e6712d3548e45f3 4f14f362bccedf0be	fb59f163a2372d09cd0fc75341d3972fdd308 7d2d507961303656b1d791b17c6
48b844494a746ca96 c7b96d6bd90f45f	7bf83b98f798f3a8f4ce85b6 d29554a435e516e3	45fba1ef399f41227ae4d14228253237b5eb 464f56cab92c91a6a964dc790622
9c13ab7b79aec8dc02 869999773cd4b2	4b4d865132329e0dd1d129 e85fc4fa9ad0c1d206	774ef04333c3fb2a6a4407654e28c2900c62 bd202ad6e5909336eb9bc180d279
450e5bf4b42691924d 09267ac1a570cb	665a563157f4aa0033a15c 88f55ac4fa28397b49	677035259ba8342f1a624fd09168c42017bd ca9ebc0b39bf6c37852899331460
51104215a618a5f56a d9c884d6832f79	801580a46f9759ceeeebbce 419d879e2ed6943fe	26ec12b63c0e4e60d839aea592c4b5dcff85 3589b53626e1dbf8c656f4ee6c64
73627cbe2ba139e2e c26889a4e8d6284	1116dc35993fce8118e1e54 21000a70b6777433f	37efe10b04090995e2f3d9f932c3653b27a65 fc76811fa583934a725d41a6b08
935f54b6609c533900 1579e96dc34244	a809327d39fab61bfcaf0c9 7b1d4b3bfb9a2cfe	a5847867730e7849117c31cdae8bb0a2500 4635d49f366fbfaebce034d865d7d
ba681db97f283c2e78 4d9bb4969b1f5a	5d28acf52f399793e82ec7e 79da47d372d9175d7	e61edbddf9aed8a52e9be1165a0440f1b6e9 943ae634148df0d0517a0cf2db13
c1ab7b68262b5ab31 c45327e7138fd25	b8c74327831e460d2b2a8e b7e68ee68938779d8d	746f0c02c832b079aec221c04d2a4eb79028 7f6d10d39b95595a7df4086f457f

MD5	SHA1	SHA256
981526650af8d6f8f20 177a26abb513a	4fee2cb5c98abbe556e9c7c cfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30 381b80b846f2e3fe5a0d2df21d
c25d45e9bbfea29cb6 d9ee0d9bf2864d	eaeff8d315cca71e997063a 2baec5cc73fad9453	a42185d506e08160cb96c81801fbe173fb07 1f4a2f284830580541e057f4423b
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477eedb422041385e 59a4fff72cb97c1	9892cc90e6712d3548e45f3 4f14f362bccedf0be	fb59f163a2372d09cd0fc75341d3972fdd308 7d2d507961303656b1d791b17c6
f818938b987236cdd4 1195796b4c1fb5	bfed40f050175935277c802 cbbbce132f44c06ec	b191a004b6d8a706aba82a2d1052bcb7bed 0c286a0a6e4e0c4723f073af52e7c
0a1cd4efda7543cec4 06a6822418daf6	af4f8d889d6a2049e7a379e a197f8cd361feb074	614cb70659ef5bb2f641f09785adc4ab5873e 0564a5303252d3c141a899253b2
d7d3d23a5e796be84 4af443bda5cd67e	a9771c591f6ccc2f3419d57 1c64ab93228785771	85f9bf4d07bc2ac1891e367f077dd513d6ca0 7705bff1b648d32a7b2dc396f5
7ab0676262c681b8e c15bdada17d7476	2f1803d444891abb604864 d476a8feac0d614f77	353e59e96cbf6ea6c16d06da5579d3815aaa eeefacabd7b35ba31f7b17207c5b
4534f2afe5f7df1d998f 37ad4e35afeb	e2cc94e471509f9fa58620b 8bb56d77f2cfe74b0	e8596675fef4ad8378e4220c22f4358fdb4a2 0531b59d7df5382c421867520a9
d27125d534e398f187 3b7f4835a79f09	1862f063c30cd02cfea6070 d3dba41ac5eee2a35	6fbfc8319ed7996761b613c18c8cb6b92a1e aed1555dae6c6b8e2594ac5fa2b9
99d59c862a082b207 a868e409ce2d97c	908a9026d61717b5fa2995 9478a9bd939da9206f	0d22d3d637930e7c26a0f16513ec438243a8 a01ea9c9d856acbcda61fcb7b499

MITRE ATT&CK TECHNIQUES

Zeppelin actors use the ATT&CK techniques listed in Table 2.

Table 2: Zeppelin Actors Att&ck Techniques for Enterprise

<u>Initial Access</u>		
Technique Title	ID	Use
Exploit External Remote Services	T1133	Zeppelin actors exploit RDP to gain access to victim networks.
Exploit Public-Facing Application	T1190	Zeppelin actors exploit vulnerabilities in an internet-facing systems to gain access to systems
Phishing	T1566	Zeppelin actors have used phishing and spear phishing to gain access to victims' networks.
<u>Execution</u>		
Technique Title	ID	Use
Malicious Link	T1204.001	Zeppelin actors trick users to click a malicious link to execute malicious macros.
Malicious File Attachment	T1204.002	Zeppelin actors trick users to click a malicious attachment disguised as advertisements to execute malicious macros.
<u>Persistence</u>		
Technique Title	ID	Use
Modify System Process	T1543.003	Zeppelin actors encrypt Windows Operating functions to preserve compromised system functions.

<u>Impact</u>		
Technique Title	ID	Use
Data Encrypted for Impact	T1486	Zeppelin actors have encrypted data on target systems or on large numbers of systems in a network to interrupt availability to system and network resources.

DETECTION

Click the attachment in this .pdf for the YARA signature: [YARA Signature](#)

MITIGATIONS

The FBI and CISA recommend network defenders apply the following mitigations to limit potential adversarial use of common system and network discovery techniques and to reduce the risk of compromise by Zeppelin ransomware:

- **Implement a recovery plan** to maintain and retain multiple copies of sensitive or proprietary data and servers in a physically separate, segmented, and secure location (i.e., hard drive, storage device, the cloud).
- **Require all accounts** with password logins (e.g., service account, admin accounts, and domain admin accounts) **to comply** with [National Institute for Standards and Technology \(NIST\) standards](#) for developing and managing password policies.
 - Use longer passwords consisting of at least 8 characters and no more than 64 characters in length;
 - Store passwords in hashed format using industry-recognized password managers;
 - Add password user “salts” to shared login credentials;
 - Avoid reusing passwords;
 - Implement multiple failed login attempt account lockouts;
 - Disable password “hints”;
 - Refrain from requiring password changes more frequently than once per year.

Note: NIST guidance suggests favoring longer passwords instead of requiring regular and frequent password resets. Frequent password resets are more likely to result in users developing password “patterns” cyber criminals can easily decipher.
 - Require administrator credentials to install software.
- **Require multifactor authentication** for all services to the extent possible, particularly for webmail, virtual private networks, and accounts that access critical systems.

- **Keep all operating systems, software, and firmware up to date.** Timely patching is one of the most efficient and cost-effective steps an organization can take to minimize its exposure to cybersecurity threats. Prioritize patching SonicWall firewall vulnerabilities and [known exploited vulnerabilities](#) in internet-facing systems. Note: SonicWall maintains a vulnerability list that includes Advisory ID, CVE, and mitigation. Their list can be found at psirt.global.sonicwall.com/vuln-list.
- **Segment networks** to prevent the spread of ransomware. Network segmentation can help prevent the spread of ransomware by controlling traffic flows between—and access to—various subnetworks and by restricting adversary lateral movement.
- **Identify, detect, and investigate abnormal activity and potential traversal of the indicated ransomware with a networking monitoring tool.** To aid in detecting the ransomware, implement a tool that logs and reports all network traffic, including lateral movement activity on a network. Endpoint detection and response (EDR) tools are particularly useful for detecting lateral connections as they have insight into common and uncommon network connections for each host.
- **Install, regularly update, and enable real time detection for antivirus software** on all hosts.
- **Review domain controllers, servers, workstations, and active directories** for new and/or unrecognized accounts.
- **Audit user accounts** with administrative privileges and configure access controls according to the principle of least privilege.
- **Disable unused ports.**
- **Consider adding an email banner to emails** received from outside your organization.
- **Disable hyperlinks** in received emails.
- **Implement time-based access for accounts set at the admin level and higher.** For example, the Just-in-Time (JIT) access method provisions privileged access when needed and can support enforcement of the principle of least privilege (as well as the Zero Trust model). This is a process where a network-wide policy is set in place to automatically disable admin accounts at the Active Directory level when the account is not in direct need. Individual users may submit their requests through an automated process that grants them access to a specified system for a set timeframe when they need to support the completion of a certain task.
- **Disable command-line and scripting activities and permissions.** Privilege escalation and lateral movement often depend on software utilities running from the command line. If threat actors are not able to run these tools, they will have difficulty escalating privileges and/or moving laterally.
- **Maintain offline backups of data**, and regularly maintain backup and restoration. By instituting this practice, the organization ensures they will not be severely interrupted, and/or only have irretrievable data.
- **Ensure all backup data is encrypted, immutable** (i.e., cannot be altered or deleted), and covers the entire organization's data infrastructure.

RESOURCES

- [Stopransomware.gov](https://stopransomware.gov) is a whole-of-government approach that gives one central location for ransomware resources and alerts.
- Resource to mitigate a ransomware attack: CISA-Multi-State Information Sharing and Analysis Center (MS-ISAC) Joint Ransomware Guide.
- No-cost cyber hygiene services: [Cyber Hygiene Services](#) and [Ransomware Readiness Assessment](#).

REPORTING

The FBI is seeking any information that can be shared, to include boundary logs showing communication to and from foreign IP addresses, a sample ransom note, communications with Zeppelin actors, Bitcoin wallet information, decryptor files, and/or a benign sample of an encrypted file. The FBI and CISA do not encourage paying ransom as payment does not guarantee victim files will be recovered. Furthermore, payment may also embolden adversaries to target additional organizations, encourage other criminal actors to engage in the distribution of ransomware, and/or fund illicit activities. Regardless of whether you or your organization have decided to pay the ransom, the FBI and CISA urge you to promptly report ransomware incidents to a [local FBI Field Office](#), or CISA at us-cert.cisa.gov/report.

DISCLAIMER

The information in this report is being provided “as is” for informational purposes only. CISA and the FBI do not endorse any commercial product or service, including any subjects of analysis. Any reference to specific commercial products, processes, or services by service mark, trademark, manufacturer, or otherwise, does not constitute or imply endorsement, recommendation, or favoring by CISA or the FBI.

REFERENCES

[1] [What is Zeppelin Ransomware? Steps to Prepare, Respond, and Prevent Infection \(coresecurity.com\)](https://www.coresecurity.com/zeppelin-ransomware)