#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.

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
981526650af8d6f8f20177a26abb513a	4fee2cb5c98abbe556e9c7ccfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30381b80b846f2e3fe5a0d2df21d
c25d45e9bbfea29cb6d9ee0d9bf2864d	eaeff8d315cca71e997063a2baec5cc73fad9453	a42185d506e08160cb96c81801fbe173fb071f4a2f284830580541e057f4423b
183b6b0c90c1e0276a2015752344a4cf	1cb5e8132302b420af9b1e5f333c507d8b2a2441	aa7e2d63fc991990958dfb795a0aed254149f185f403231eaebe35147f4b5ebe
9349e1cc3de7c7f6893a21bd6c3c4a6b	db398e38ee6221df7e4aa49d8f96799cca4d87e1	a2a9385cbbcfacc2d541f5bd92c38b0376b15002901b2fd1cc62859e161a8037
c8f75487d0d496a3746e6c81a5ecc6dc	4b91a91a98a2f0128c80f8ceeef0f5d293adf0cd	54d567812eca7fc5f2ff566e7fb8a93618b6d2357ce71776238e0b94d55172b1
477eedb422041385e59a4fff72cb97c1	9892cc90e6712d3548e45f34f14f362bccedf0be	fb59f163a2372d09cd0fc75341d3972fdd3087d2d5079613030656b1d791b17c6
5841ef35aaff08bb03d25e5afe3856a2	ffd228b0d7afe7cab4e9734f7093e7ba01c5a06e	1e3c5a0aa079f8dfcc49cdca82891ab78d016a919d9810120b79c5deb332f388
d6c4b253ab1d169cf312fec12cc9a28f	0f47c279fea1423c7a0e7bc967d9ff3fae7a0de8	347f14497df4df73bc414f4e852c5490b12db991a4b3811712bac7476a3f1bc9
fba7180ad49d6a7f3c60c890e2784704	f561f9e3c949fe87f12dbfa166ffb2eb85712419	7d8c4c742689c097ac861fcbf7734709fd7dcab1f7ef2ceffb4b0b7dec109f55
bc6c991941d9afbd522fa0a2a248a97a	a243ce234fc8294e2e2e5264 18b4eaadc2d6c84f	37c320983ae4c1fd0897736a53e5b0481edb1d1d91b366f047aa024b0fc0a86e
f3490951ae51922cb360a3d76a670159	e2cb60be111716e32db7ca2365ad6e73c30f0e21	894b03ed203cfa712a28ec472efec0ca9a55d6058115970fe7d1697a3ddb0072
e4f1f05c2e6c3fc2f3336a8c8799ffb4	dbd9fcf2b05e703d34181c46f4c22392b9fcc1da	307877881957a297e41d75c84e9a965f1cd07ac9d026314dcaff55c4da23d03e
aa2048271f0aef3383480ce4a7c93b52	512b16ea74027fa4d0055831de5e51278812c8de	bafd3434f3ba5bb9685e239762281d4c7504de7e0cfd9d6394e4a85b4882ff5d
f66b738e1bfe1f8aab510abed850c424	571f50fee0acad1da39fe06c75116461800cc719	faa79c796c27b11c4f007023e50509662eac4bca99a71b26a9122c260abfb3c6

MD5	SHA1	SHA256
981526650af8d6f8f20177a26abb513a	4fee2cb5c98abbe556e9c7ccfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30381b80b846f2e3fe5a0d2df21d
c25d45e9bbfea29cb6d9ee0d9bf2864d	eaeff8d315cca71e997063a2baec5cc73fad9453	a42185d506e08160cb96c81801fbe173fb071f4a2f284830580541e057f4423b
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bb30f050546f5d6e61fafc59eaf097c3	ee44179f64918f72a8d2e88a5074d89efab3d81b	e48cf17caffc40815efb907e522475722f059990afc19ac516592231a783e878
78621f1e196497d440afb57f4609fcf9	eed7c3bb3fc5181b88abeed2204997f350324022	4a4be110d587421ad50d2b1a38b108fa05f314631066a2e96a1c85cc05814080
f4e0ee0200de397691748a2cdcd7e34a	bd3f6b878284a63c72e8354e877e3f48d6fca53c	9ef90ec912543cc24e18e73299296f14cb2c931a5d633d4c097efa372ae59846
cf5a358a22326f09fd55983bb812b7d8	1addcffae4fd4211ea242022783c2ffad6771aa34	dd89d939c941a53d6188232288a3bd73ba9baf0b4ca6bf6ccca697d9ee42533f
7afe492a38ca6f27e24028aab68406b5	5870a3adbce9737319f3c9461586d5f2afbc7adb	79d6e498e7789aaccd8caa610e8c15836267c6a668c322111708cf80bc38286c
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17c5cae3bce5832dd42986fe612517d9	6f70e73c53d7622d8c4808ae7849133df1343484	d618c1ccd24d29e911cd3e899a4df2625155297e80f4c5c1354bc2e79f70768c
bfe7f54f1f0640936dd7a3384608b1f6	9436ccee41c01ca3cb4db55c10884615aba76d19	8170612574f914eec9e66902767b834432a75b1d6ae510f77546af2a291a48a2

MD5	SHA1	SHA256
981526650af8d6f8f20177a26abb513a	4fee2cb5c98abbe556e9c7ccfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30381b80b846f2e3fe5a0d2df21d
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981526650af8d6f8f20177a26abb513a	4fee2cb5c98abbe556e9c7ccfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30381b80b846f2e3fe5a0d2df21d
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d27125d534e398f1873b7f4835a79f09	1862f063c30cd02cfea6070d3dba41ac5eee2a35	6fbfc8319ed7996761b613c18c8cb6b92a1eaed1555dae6c6b8e2594ac5fa2b9
4534f2afe5f7df1d998f37ad4e35afeb	e2cc94e471509f9fa58620b8bb56d77f2cfe74b0	e8596675fef4ad8378e4220c22f4358fdb4a20531b59d7df5382c421867520a9
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6607d8c1a28d7538e2a6565cf40d1260	f618879c011cde3440660722949f025827feea663	594df9c402abfdc3c838d871c3395ac047f256b2ac2fd6ff66b371252978348d
caa7a669da39ffd8a3a4f3419018b363	44538b7f8f065e3cef0049089a8522a76a7fccc6	2dffe3ba5c70af51ddf0ff5a322eba0746f3bf3ae0751beb3dc0059ed3faaf3d

MD5	SHA1	SHA256
981526650af8d6f8f20177a26abb513a	4fee2cb5c98abbe556e9c7ccfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30381b80b846f2e3fe5a0d2df21d
c25d45e9bbfea29cb6d9ee0d9bf2864d	eaeff8d315cca71e997063a2baec5cc73fad9453	a42185d506e08160cb96c81801fbe173fb071f4a2f284830580541e057f4423b
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c1ab7b68262b5ab31c45327e7138fd25	b8c74327831e460d2b2a8eb7e68ee68938779d8d	746f0c02c832b079aec221c04d2a4eb790287f6d10d39b95595a7df4086f457f

MD5	SHA1	SHA256
981526650af8d6f8f20177a26abb513a	4fee2cb5c98abbe556e9c7ccfebe9df4f8cde53f	001938ed01bfde6b100927ff8199c65d1bff30381b80b846f2e3fe5a0d2df21d
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f818938b987236cdd41195796b4c1fb5	bfed40f050175935277c802cbbbce132f44c06ec	b191a004b6d8a706aba82a2d1052bcb7bed0c286a0a6e4e0c4723f073af52e7c
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d7d3d23a5e796be844af443bda5cd67e	a9771c591f6ccc2f3419d571c64ab93228785771	85f9bf4d07bc2ac1891e367f077dd513d6ca07705bffd1b648d32a7b2dc396f5
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4534f2afe5f7df1d998f37ad4e35afeb	e2cc94e471509f9fa58620b8bb56d77f2cfe74b0	e8596675fef4ad8378e4220c22f4358fdb4a20531b59d7df5382c421867520a9
d27125d534e398f1873b7f4835a79f09	1862f063c30cd02cfea6070d3dba41ac5eee2a35	6fbfc8319ed7996761b613c18c8cb6b92a1eaed1555dae6c6b8e2594ac5fa2b9
99d59c862a082b207a868e409ce2d97c	908a9026d61717b5fa29959478a9bd939da9206f	0d22d3d637930e7c26a0f16513ec438243a8a01ea9c9d856acbcda61fcb7b499

MITRE ATT&CK TECHNIQUES

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

Table 2: Zeppelin Actors Att&ck Techniques for Enterprise

Initial Access		
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.
Execution		
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.
Persistence		
Technique Title	**ID**	**Use**
Modify System Process	T1543.003	Zeppelin actors encrypt Windows Operating functions to preserve compromised system functions.

Impact		
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.

TLP: WHITE

- **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 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

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REFERENCES

[1] What is Zeppelin Ransomware? Steps to Prepare, Respond, and Prevent Infection (coresecurity.com)