CVE-2020-1472: Advanced Persistent Threat Actors Use Zerologon Vulnerability In Exploit Chain with Unpatched Vulnerabilities

By Satnam Narang

Published: 2020-10-12 · Archived: 2026-04-05 15:35:07 UTC

U.S. Government agencies issue joint cybersecurity advisory cautioning that advanced threat groups are chaining vulnerabilities together to gain entry into government networks and elevate privileges.

Update October 13, 2020: The Identifying affected systems section has been updated to include details about the availability of a Zerologon scan template for Tenable.io, Tenable.sc and Nessus.

Background

On October 9, the Cybersecurity Infrastructure Security Agency (CISA) and the Federal Bureau of Investigation (FBI) published a joint cybersecurity advisory. The advisory, identified as Alert AA20-283A, provides insight into advanced persistent threat (APT) actors' activity against networks associated with federal and state, local, tribal, and territorial (SLTT) governments. The alert details how APT actors are using vulnerability chaining or exploit chaining, incorporating a recently disclosed elevation of privilege vulnerability in their attacks.

The following is a list of vulnerabilities referenced in the CISA/FBI joint cybersecurity alert:

CVE	Vendor/Product	CVSSv3	Tenable VPR*	Disclosed
CVE-2019-11510	Pulse Connect Secure SSL VPN	10.0	10.0	Apr 2019
CVE-2018-13379	Fortinet FortiOS SSL VPN	9.8	9.8	May 2019
CVE-2019-19781	Citrix Netscaler	9.8	9.9	Dec 2019
CVE-2020-1631	Juniper Junos OS	9.8	6.7	Apr 2020
CVE-2020-2021	Palo Alto Networks PAN-OS	10.0	10.0	Jun 2020
CVE-2020-5902	F5 BIG-IP	9.8	9.9	Jul 2020
CVE-2020-15505	MobileIron	9.8	9.5	Jul 2020
CVE-2020-1472	Microsoft Netlogon	10.0	10.0	Aug 2020

*Please note Tenable VPR scores are calculated nightly. This blog post was published on October 12 and reflects VPR at that time.

Analysis

Initial access gained through SSL VPN vulnerability

According to the CISA/FBI alert, the APT actors are "predominantly" using CVE-2018-13379 to gain initial access to target environments.

CVE-2018-13379 is a path traversal vulnerability in Fortinet's FortiOS Secure Socket Layer (SSL) virtual private network (VPN) solution. It was patched by Fortinet in April 2019. However, it wasn't until after exploitation details were made public in August 2019 that reports emerged of attackers exploiting it in the wild.

In addition to the Fortinet vulnerability being used to gain initial access, CISA/FBI have also observed "to a lesser extent," APT actors using CVE-2020-15505, a remote code execution vulnerability in MobileIron's Core and Connector.

Post exploitation elevation of privilege using Zerologon

Once the APT actors have gained an initial foothold into their target environments, they are elevating privileges using CVE-2020-1472, a critical elevation of privilege vulnerability in Microsoft's Netlogon. Dubbed "Zerologon," the vulnerability has gained notoriety after it was initially patched in Microsoft's August Patch Tuesday release.

On September 18, CISA issued Emergency Directive 20-04 in an effort to ensure Federal Civilian Executive Branch systems were patched against the vulnerability.

Zerologon observed as part of attacks in the wild

On September 23, Microsoft's Security Intelligence team tweeted that they had observed the Zerologon exploits being "incorporated into attacker playbooks" as part of threat actor activity.

In a follow-up tweet on October 6, Microsoft's Security Intelligence team noted a new campaign leveraging CVE-2020-1472 originating from a threat actor known as CHIMBORAZO, also known as TA505, a financially motivated nation-state actor.

CISA/FBI warn of additional vulnerabilities being targeted for initial access

In addition to the Fortinet and MobileIron vulnerabilities identified in recent campaigns, the CISA/FBI alert also warns that these APT threat actors may also leverage one of the following vulnerabilities to gain entry into their targeted networks:

- CVE-2019-11510 is an arbitrary file disclosure vulnerability in Pulse Connect Secure SSL VPN
- CVE-2019-19781 is a path traversal vulnerability in Citrix Application Delivery Controller (ADC), Citrix Gateway and Citrix SD-WAN WANOP appliances
- CVE-2020-1631 is a local file inclusion (LFI) vulnerability in Juniper's Junos OS HTTP/HTTPS service
- CVE-2020-2021 is an authentication bypass vulnerability in the Security Assertion Markup Language (SAML) authentication in PAN-OS when certain prerequisites are met
- CVE-2020-5902 is a path traversal vulnerability in the traffic management user interface (TMUI) in F5's BIG-IP application delivery service.

Evergreen vulnerabilities remain popular amongst threat actors

Many of the vulnerabilities referenced in this joint alert from CISA/FBI have become evergreen flaws for threat actors. As part of CISA's Top 10 Routinely Exploited Vulnerabilities alert, they reference both the Pulse Secure and Citrix ADC vulnerabilities.

In September, CISA issued two separate alerts (AA20-258A, AA20-259A) that highlight how APT actors from China and Iran are targeting unpatched vulnerabilities in Pulse Connect Secure, Citrix ADC, and F5's BIG-IP.

Elections support systems accessed, yet elections data integrity intact

In Alert AA20-283A, CISA mentions that they observed activity that "resulted in unauthorized access to elections support systems." However, they also mention that despite said unauthorized access, they have no evidence to support that the "integrity of elections data has been compromised."

Zerologon needs to be patched immediately

With the latest alert from CISA and the FBI, coupled with reporting from other vendors, it seems clear that Zerologon is becoming one of the most critical vulnerabilities of 2020.

Proof of concept

A number of proofs-of-concept (PoC) and exploit scripts were made available soon after these vulnerabilities were publicly disclosed. The following is a subset of some of the PoCs and exploit scripts:

CVE	Source URL
CVE-2018-13379	GitHub
CVE-2018-13379	GitHub
CVE-2018-13379	GitHub
CVE-2019-11510	GitHub
CVE-2019-11510	GitHub
CVE-2019-11510	GitHub
CVE-2019-19781	GitHub
CVE-2019-19781	GitHub
CVE-2019-19781	GitHub
CVE-2020-5902	GitHub
CVE-2020-5902	GitHub
CVE-2020-5902	GitHub

CVE	Source URL
CVE-2020-15505	GitHub
CVE-2020-1472	GitHub
CVE-2020-1472	GitHub
CVE-2020-1472	GitHub

Solution

Patches are available for all of the vulnerabilities referenced in the joint cybersecurity advisory from CISA and the FBI. Most of the vulnerabilities had patches available for them following their disclosure, with the exception of CVE-2019-19781, which received patches a month after it was originally disclosed.

Please refer to the individual advisories below for further details.

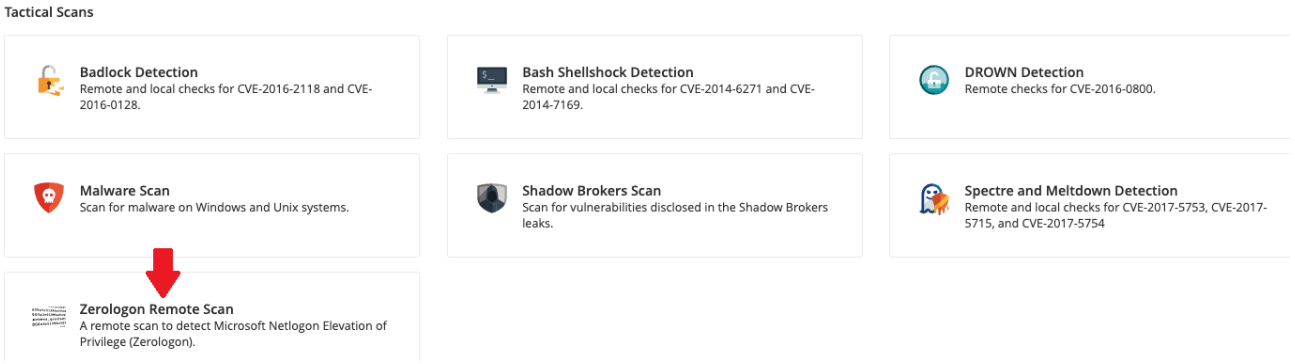
CVE	Patch Information
CVE-2019-11510	SA44101 - 2019-04: Out-of-Cycle Advisory: Multiple vulnerabilities resolved in Pulse Connect Secure / Pulse Policy Secure 9.0RX
CVE-2018-13379	FG-IR-18-384: FortiOS system file leak through SSL VPN via specially crafted HTTP resource requests
CVE-2019-19781	Vulnerability in Citrix Application Delivery Controller, Citrix Gateway, and Citrix SD-WAN WANOP appliance
CVE-2020-1631	2020-04 Out of Cycle Security Advisory: Junos OS: Security vulnerability in J-Web and web based (HTTP/HTTPS) services
CVE-2020-2021	PAN-OS: Authentication Bypass in SAML Authentication
CVE-2020-5902	K52145254: TMUI RCE vulnerability CVE-2020-5902
CVE-2020-15505	July 2020: MobileIron Security Updates Available
CVE-2020-1472	Netlogon Elevation of Privilege Vulnerability

Identifying affected systems

A list of Tenable plugins to identify these vulnerabilities can be found here:

- CVE-2019-11510
- CVE-2018-13379
- CVE-2019-19781
- CVE-2020-1631
- CVE-2020-2021
- CVE-2020-5902
- CVE-2020-15505
- CVE-2020-1472
- All CVEs combined

Tenable.io, Tenable.sc and Nessus users can use a new scan template dedicated to targeting Zerologon. Plugin 140657 and its dependencies are automatically enabled within the template, and it also comes with the required settings automatically configured.



Join Tenable's Security Response Team on the Tenable Community.

Learn more about Tenable, the first Cyber Exposure platform for holistic management of your modern attack surface.

Get a free 30-day trial of Tenable.io Vulnerability Management.

Satnam Narang

Senior Staff Research Engineer, Security Response

Satnam joined Tenable in 2018. He has over 15 years experience in the industry (M86 Security and Symantec). He contributed to the Anti-Phishing Working Group, helped develop a Social Networking Guide for the National Cyber Security Alliance, uncovered a huge spam botnet on Twitter and was the first to report on spam bots on Tinder. He's appeared on NBC Nightly News, Entertainment Tonight, Bloomberg West, and the Why Oh Why podcast.

Interests outside of work: Satnam writes poetry and makes hip-hop music. He enjoys live music, spending time with his three nieces, football and basketball, Bollywood movies and music and Grogu (Baby Yoda).

Source: https://www.tenable.com/blog/cve-2020-1472-advanced-persistent-threat-actors-use-zerologon-vulnerability-in-exploit-chain