

LEADERSHIP FOR IT SECURITY & PRIVACY ACROSS HHS

HHS CYBERSECURITY PROGRAM

OFFICE OF INFORMATION SECURITY

HC3 Intelligence Briefing BlueKeep Update

OVERALL CLASSIFICATION IS

TLP:WHITE

December 05, 2019

Agenda

- What is BlueKeep
- Timeline of BlueKeep
- BlueKeep Today
- Initial Attempts to Exploit BlueKeep
- Why Initial Attempts Failed
- BlueKeep Tomorrow
- Mitigations
- Indicators of Compromise (IOCs)
- HC3 Contact Information
- References



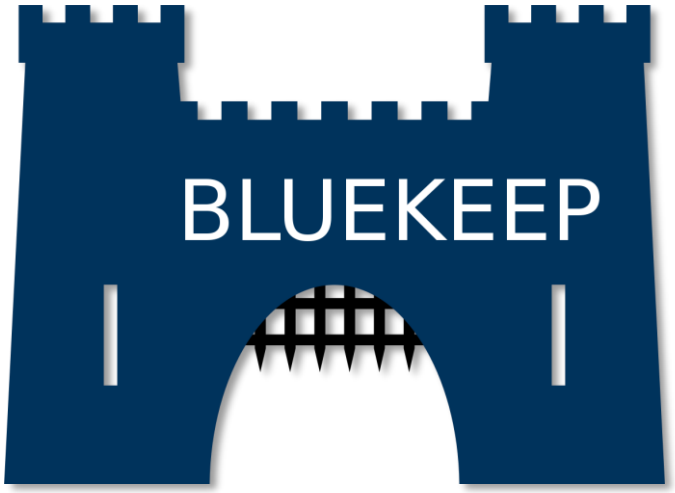
Slides Key:

Non-Technical: managerial, strategic and high-level (general audience)

Technical: Tactical / IOCs; requiring in-depth knowledge (sysadmins, IRT)

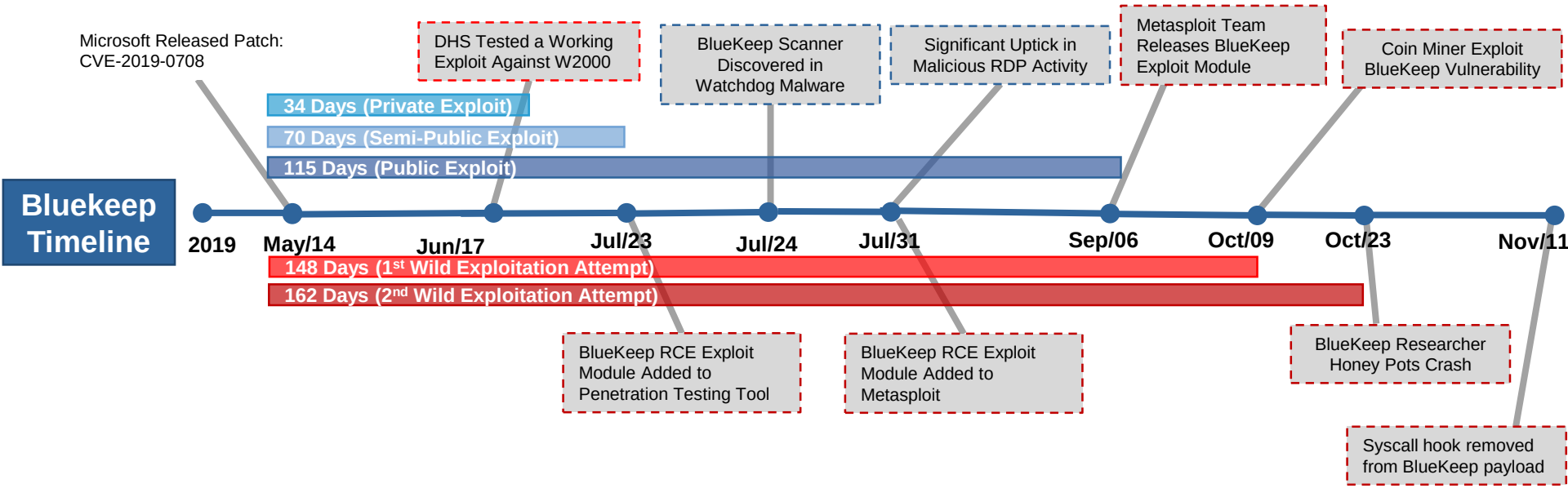
What is BlueKeep

- BlueKeep (CVE-2019-0708)
  - Vulnerability in Microsoft's (MS) Remote Desktop Protocol
    - Grants hackers full remote access and code execution on unpatched machines
      - No user interaction required
      - Essential owns the machine, malicious actor can do as they please
    - Affects: Windows XP, 7, Server 2003, Server 2008, and Server 2008 R2
      - Deja Blue(Related BlueKeep Vulnerabilities) affects: Windows 8, 10, and all older windows versions
      - EternalBlue affects: Server Message Block version 1 (SMBv1)
    - "Wormable" meaning it has the ability to self propagate (think WannaCry level of damage)
    - MS, NSA, DHS, many other security vendors released advisories and warning on this exploit



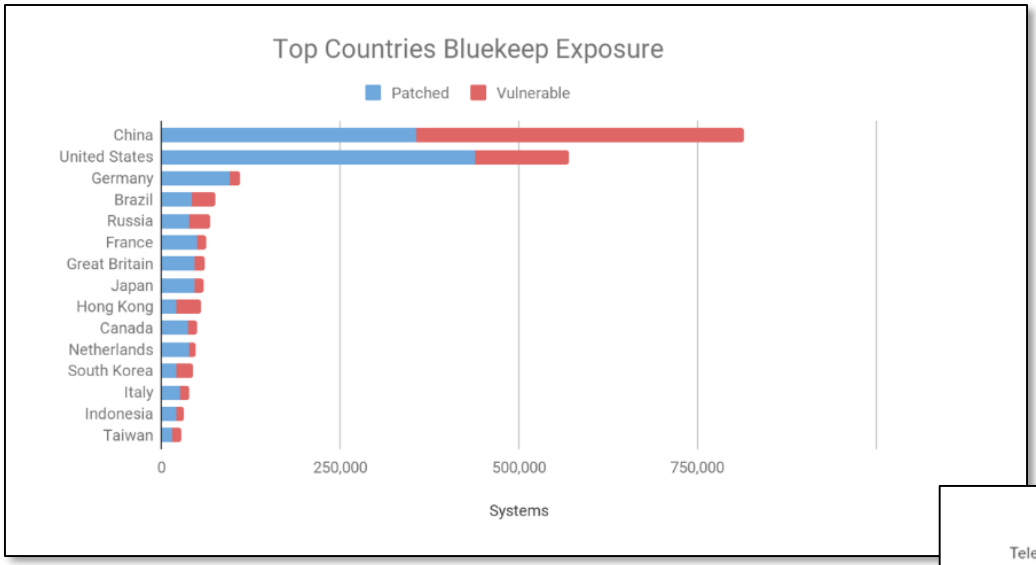


BlueKeep Timeline



Tencent RiskSense Microsoft Rapid7

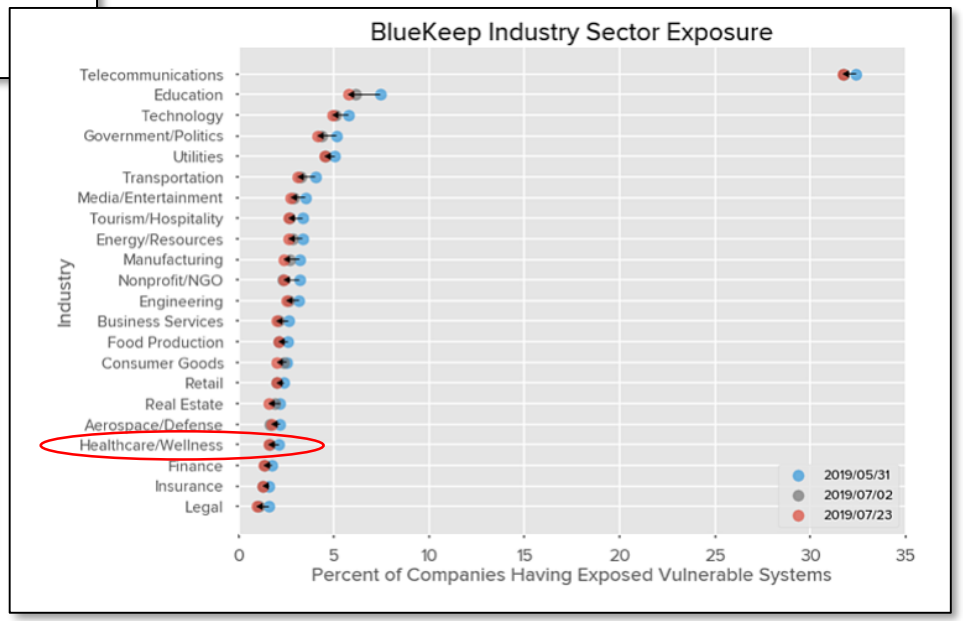
BlueKeep Today



- Data Covers May 31 to July 2, 2019
- "As of July 2, 2019, approximately **805,665 systems** remain online that are vulnerable to BlueKeep, representing a decrease of 17.18% (167,164 systems) compared to May 31."

"There has been progress made across the board as all industries have demonstrated a reduction in the number of organizations with exposed vulnerable systems since data collected on May 31, 2019, with variable amount of progress made within each industry." ~BitSight

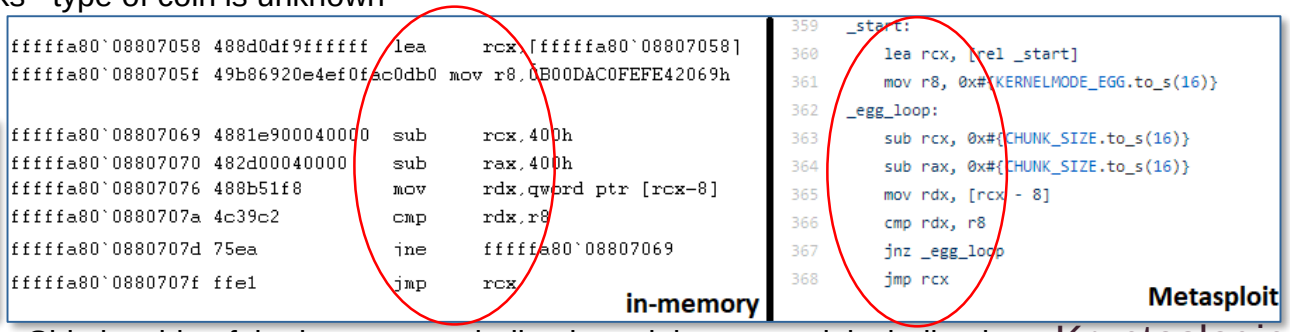
BitSight



BlueKeep Today

- Out in the Wild!
  - Don't panic just yet
  - Spotted by security researchers Kevin Beaumont and Marcus Hutchins in early Nov
    - Beaumont's honeypots, set up to detect and monitor BlueKeep, kept crashing with "Blue Screen Of Deaths".
    - Sent Logs to Hutchins for deep dive analysis
  - Conclusion
    - No worm function
    - No self propagation
    - Used in low level attacks
      - Done by same group of malicious actors
      - Wild BlueKeep Shellcode matches Metasploits Shellcode
      - Attacks in Sept and Oct shared the same Command and Control infrastructure
        - Attackers most likely using manual port scans to find vulnerable machines
      - Cryptomining attacks ~type of coin is unknown

"They're not seeking targets. They're scanning the internet and spraying exploits."
Marcus Hutchins – Kryptos Logic



Side by side of the in-memory shellcode and the metasploit shellcode Kryptoslogic

Initial Attempts to Exploit BlueKeep

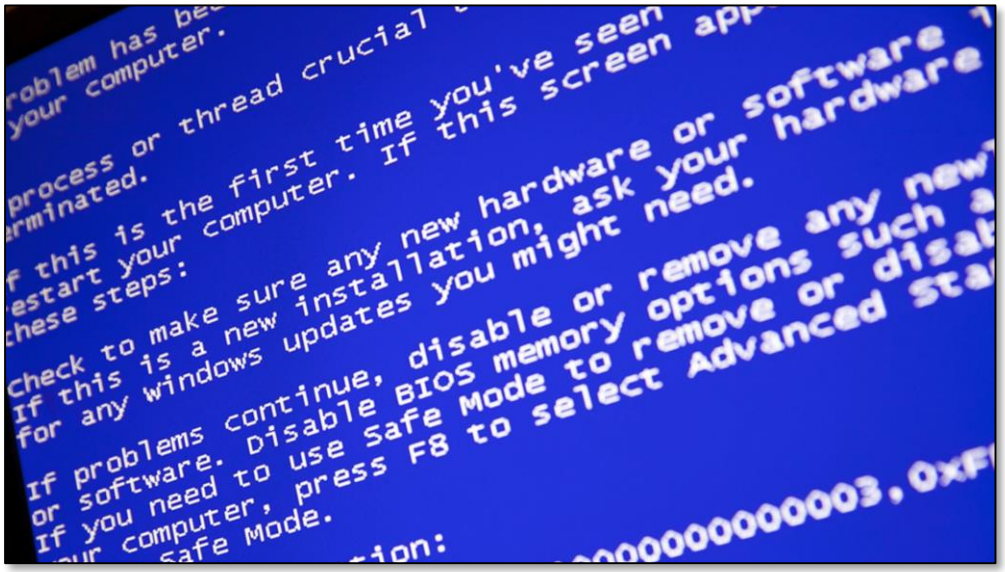
MITRE ATT&CK	Threat technique or component	Protections
T1190 | Network Service Scanning	1. Scans for vulnerable RDP services	Security update for CVE-2019-0708
T1190 | Exploit Public-Facing Application	2. BlueKeep RDP exploit	Windows Defender Antivirus; Security update for CVE-2019-0708; Network level authentication
T1086 | PowerShell T1064 | Scripting T1027 | Obfuscated File or Information T1140 | Deobfuscate/Decode Files or Information	3. Download and execution of multiple obfuscated PowerShell scripts	EDR Endpoint Detection Response
	4. Coin miner payload	Windows Defender Antivirus
T1053 | Scheduled Task	5. Scheduled task for payload persistence	EDR
T1043 | Commonly Used Port T1065 | Uncommonly Used Port	6. C&C communication	EDR

Microsoft

Why Initial Attempts Failed

- BlueKeep is a Fussy Exploit
  - Reason why the attack failed was because of an incompatibility between the exploit code and a patch Microsoft had previously issued for the Intel CPU vulnerability known as Meltdown
  - Caused many machines to crash, causing many people to discount the potential severity of the Bluekeep vulnerability.
  - Already adapted
    - This incompatibility has already been fixed and patched into the Metasploit BlueKeep Module

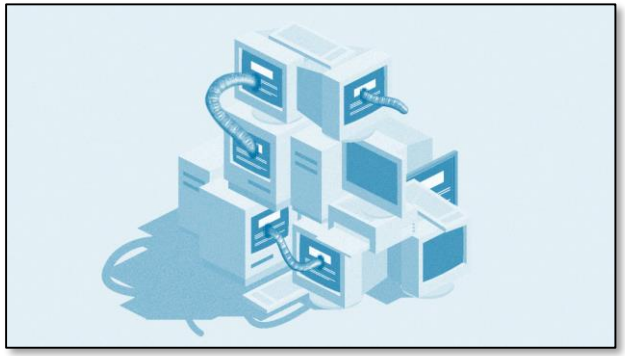




BlueKeep Tomorrow

- Where can BlueKeep go?
  - Will continue to evolve, the risk of this vulnerability can change over time
  - Malicious Actors will focus on efforts that offer the greatest return (money) for effort
    - Wormable feature may used in future attacks
      - Can spread without human interaction
      - Loaded with ransomware or other malicious programs
      - Can cause significant damage (ex. WannaCry)
  - Future attacks may focus supply chain partners
    - Unpatched Servers
    - Managed Service Providers
  - Unpatched systems will remain key in BlueKeep future success
    - Don't fall into the "Avoidance"(letting an acknowledged risk linger because there is no perceived penalty in procrastinating) trap





BlueKeep Mitigations

405(d) cybersecurity practice references denoted in red

- Patch and keep the system and its applications updated (or employ virtual patching to legacy or end-of-life systems) [7.S.A], [7.M.D]
- Restrict or secure the use of remote desktop services. For example, blocking port 3389 (or disabling it when not in use), can help thwart threats from initiating connections to systems behind the firewall [3.S.A], [3.M.A], [3.L.C]
- Enable network level authentication (NLA) to prevent unauthenticated attackers from exploiting BlueKeep. This can be configured in Windows 7 and Windows Server 2008 (including the R2 version) [3.S.A], [3.M.A], [3.L.C]
- Enforce the principle of least privilege. Employing security mechanisms like encryption, lockout policies, and other permission- or role-based access controls provide additional layers of security against attacks or threats that involve compromising remote desktops. [3.S.A], [3.M.A], [3.L.C]

HHS 405(d)
Aligning Health Care Industry Security Approaches

https://www.phe.gov/Preparedness/planning/405d/Pages/hic-practices.aspx

BlueKeep Indicators of Compromise

- IOCs
  - IP Addresses
  - 109.176.117.11 port 8000
  - 5.100.251.106 port 52057
  - 217.114.18.50 port 52107
  - 193.27.73.223
  - 217.23.5.20
  - 157.245.82.38
  - 193.104.205.59
  - 217.23.5.70
  - 167.172.224.148
  - 160.20.146.133
  - 138.201.209.190
  - 167.71.240.219
  - 193.104.205.59
  - URLs
  - hxxp://178.175.141.12:7023/9bccfaf8cd92/temp
  - hxxp://178.175.141.12:11008/6b53002fb437/temp
  - hxxp://138.201.209.190:10708/cc1ad438c54a/temp

DoublePulsar

References

- Microsoft works with researchers to detect and protect against new RDP exploits
  https://www.microsoft.com/security/blog/2019/11/07/the-new-cve-2019-0708-rdp-exploit-attacks-explained/
- BlueKeep (CVE-2019-0708): From Rumor to Reality
  https://risksense.com/blog/bluekeep-cve-2019-0708-from-rumor-to-reality/
- DejaBlue vs BlueKeep vs Eternal Blue
  https://www.linkedin.com/posts/jpcastro_exploit-dejablue-vulnerability-activity-6568053655193346048-KY6S/
- Alert (AA19-168A) Microsoft Operating Systems BlueKeep Vulnerability
  https://www.us-cert.gov/ncas/alerts/AA19-168A
- Patch Remote Desktop Services on Legacy Versions of Windows
  https://www.nsa.gov/Portals/70/documents/what-we-do/cybersecurity/professional-resources/csa-bluekeep_20190604.pdf?ver=2019-06-04-123329-617
- CVE-2019-1182 | Remote Desktop Services Remote Code Execution Vulnerability
  https://portal.msrc.microsoft.com/en-US/security-guidance/advisory/CVE-2019-1182
- CVE-2019-1181 | Remote Desktop Services Remote Code Execution Vulnerability
  https://portal.msrc.microsoft.com/en-US/security-guidance/advisory/CVE-2019-1181
- CVE-2019-0708
  https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2019-0708

References

- Solved: Why in-the-wild Bluekeep exploits are causing patched machines to crash
  https://arstechnica.com/information-technology/2019/11/solved-why-in-the-wild-bluekeep-exploits-are-causing-patched-machines-to-crash/
- Spectre and Meltdown: What you need to know
  https://www.tripwire.com/state-of-security/vert/spectre-meltdown-what-you-know/
- BlueKeep: What you Need to Know
  https://www.tripwire.com/state-of-security/featured/bluekeep-what-you-need-to-know/
- Fixing Remote Windows Kernel Payloads to Bypass Meltdown KVA Shadow
  https://zerosum0x0.blogspot.com/2019/11/fixing-remote-windows-kernel-payloads-meltdown.html
- The First BlueKeep Mass Hacking Is Finally Here—but Don't Panic
  https://www.wired.com/story/bluekeep-hacking-cryptocurrency-mining/
- BlueKeep (CVE 2019-0708) exploitation spotted in the wild
  https://www.kryptoslogic.com/blog/2019/11/bluekeep-cve-2019-0708-exploitation-spotted-in-the-wild/?source=post_page-----bd6ee6e599a6----------
- BlueKeep exploitation activity seen in the wild
  https://doublepulsar.com/bluekeep-exploitation-activity-seen-in-the-wild-bd6ee6e599a6

References

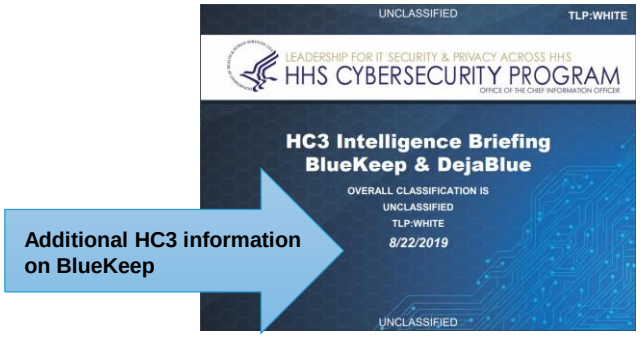
- Avast Business report may help explain why users are resisting Microsoft's BlueKeep patch
  https://blog.avast.com/avast-report-bluekeep-patch
- Will BlueKeep Become WannaCry 2.0?
  https://www.bitsight.com/blog/will-bluekeep-become-wannacry-2.0
- The much-publicized BlueKeep threat has finally emerged – why should you care?
  https://blog.avast.com/what-is-bluekeep
- Debunking The BlueKeep Exploit Hype – What You Should Know
  https://businessinsights.bitdefender.com/debunking-the-bluekeep-exploit-hype-what-you-should-know
- Remove syscall hook from BlueKeep payload
  https://github.com/rapid7/metasploit-framework/pull/12553
- Data Insights on the BlueKeep Vulnerability
  https://www.bitsight.com/blog/data-insights-on-bluekeep-vulnerability?utm_campaign=public-relations&utm_source=public-relations&utm_medium=referral

HC3 Contact Information

Upcoming Brief

Incident Response

Emotet Update



HC3 Bluekeep/DejaBlue briefing (Aug 2019)



HC3 White Paper - BlueKeep: High Risk Windows Vulnerability

Product Evaluations

Recipients of this and other Healthcare Sector Cybersecurity Coordination Center (HC3) Threat Intelligence products are highly encouraged to provide feedback to **HC3@HHS.GOV**.

Requests for Information

Need information on a specific cybersecurity topic? Send your request for information (RFI) to **HC3@HHS.GOV** or call us Monday-Friday, between 9am-5pm (EST), at **(202) 691-2110.**