

# RISK AND VULNERABILITY ASSESSMENT (RVA) MAPPED TO THE MITRE ATT&CK® FRAMEWORK

FISCAL YEAR 2019 (FY19)

Risk and Vulnerability Assessment: Upon request, CISA can identify vulnerabilities that adversaries could potentially exploit to compromise security controls. We collect data in an on-site assessment and combine it with national threat information to provide customers with a tailored risk analysis report.



## + HOW WE LATERAL AND ESCALATE

### Attack Path 1: Gone Phishin'

- Initial Access » Spearphishing Link and MSHTA
- Execution » PowerShell
- Defense Evasion » Process Injection and MSHTA
- Command & Control » Commonly Used Port



### Attack Path 2: You've Poisoned My LLMNR

- Credential Access » LLMNR/NBT-NS Poisoning and Relay Brute Force
- Discovery » Network Sniffing



### Attack Path 3: The OI' Discover & Dump

- Discovery » Permissions Group Discovery System Owner/User Discovery
- Execution » Windows Management Instrumentation
- Persistence/ Defense Evasion/ Privilege Escalation » Valid Accounts



### Attack Path 4: I Like My Kerberos Well-Done

- Initial Access » Kerberoasting Brute Force
- Persistence/ Defense Evasion/ Privilege Escalation » Valid Accounts



### Attack Path 5: Is That a Cleartext Password or SSH Key, I See?

- Credential Access » Credentials in Files Bash History Private Keys Valid Accounts
- Persistence/ Defense Evasion/ Privilege Escalation » Valid Accounts



## FY19 RVA RESULTS

### MITRE ATT&CK Tactics and Techniques

The percent noted for each technique represents the success rate for that technique across all RVAs. For example, spearphishing link was used to gain initial access in 45.5% of the FY19 RVAs.

### 44 Total Number of Assessments

#### Initial Access

- 45.5% Spearphishing Link
- 4.5% Exploit Public-Facing Application
- 2.3% Spearphishing Attachment

#### Execution

- 70.5% PowerShell
- 63.6% Command-Line Interface
- 45.5% MSHTA
- 45.5% Service Execution
- 43.2% Windows Management Instrumentation
- 18.2% Graphical User Interface
- 11.4% Scripting
- 9.1% User Execution
- 9.1% Exploitation for Client Execution
- 2.3% Execution through API

#### Persistence

- 25.0% Valid Accounts
- 9.1% New Service
- 4.5% Create Account
- 2.3% Windows Management Instrumentation Event Subscription
- 2.3% Registry Run Keys/Startup Folder
- 2.3% Launch Agent

#### Privilege Escalation

- 25.0% Valid Accounts
- 20.5% Exploitation for Privilege Escalation
- 20.5% Access Token Manipulation
- 15.9% Process Injection
- 9.1% New Service
- 9.1% Bypass User Account Control
- 2.3% Sudo
- 2.3% Exploitation of Vulnerability

#### Defense Evasion

- 45.5% MSHTA
- 36.4% Process Hollowing
- 25.0% Valid Accounts
- 20.5% Access Token Manipulation
- 15.9% Process Injection
- 11.4% Scripting
- 11.4% Obfuscated Files or Information
- 9.1% Bypass User Account Control
- 6.8% Indicator Removal from Tools
- 6.8% Hidden Window
- 6.8% File Deletion
- 4.5% Masquerading
- 4.5% DLL Side-Loading
- 2.3% Process Doppelganging
- 2.3% Disabling Security Tools

#### Credential Access

- 88.6% Credential Dumping
- 68.2% LLMNR/NBT-NS Poisoning
- 38.6% Credentials in Files
- 22.7% Kerberoasting
- 20.5% Brute Force
- 15.9% Network Sniffing
- 11.4% Input Capture
- 9.1% Account Manipulation
- 4.5% Exploitation of Credential Access
- 2.3% Private Keys
- 2.3% Forced Authentication
- 2.3% Credentials in Registry
- 2.3% Bash History

#### Discovery

- 63.6% Account Discovery
- 50.0% Network Service Scanning
- 47.7% File & Directory Discovery
- 45.5% Network Share Discovery
- 43.2% Remote System Discovery
- 40.9% Process Discovery
- 31.8% Password Policy Discovery
- 27.3% System Owner/User Discovery
- 27.3% Permission Groups Discovery
- 18.2% System Service Discovery
- 18.2% Security Software Discovery
- 13.6% System Information Discovery
- 11.4% System Network Configuration Discovery

- 4.5% System Time Discovery
- 4.5% System Network Connections Discovery
- 4.5% Query Registry
- 2.3% Peripheral Device Discovery

#### Lateral Movement

- 61.4% Pass the Hash
- 52.3% Remote Desktop Protocol
- 22.7% Windows Admin Shares
- 22.7% Remote Services
- 13.6% Exploitation of Remote Services
- 9.1% Pass the Ticket
- 2.3% Remote File Copy
- 2.3% Distributed Component Object Model

#### Collection

- 47.7% Screen Capture
- 45.5% Data from Local System
- 36.4% Data from Network Shared Drive
- 22.7% Automated Collection
- 11.4% Man in the Browser
- 11.4% Input Capture
- 2.3% Email Collection
- 2.3% Data from Information Repositories
- 2.3% Clipboard Data

#### Command & Control

- 54.5% Commonly Used Port
- 20.5% Data Encoding
- 18.2% Remote Access Tools
- 18.2% Connection Proxy
- 11.4% Standard Application Layer Protocol
- 9.1% Data Obfuscation
- 9.1% Custom Command & Control Protocol
- 4.5% Standard Cryptographic Protocol
- 2.3% Remote File Copy
- 2.3% Multi-hop Proxy

#### Exfiltration

- 18.2% Scheduled Transfer
- 13.6% Exfiltration over Command & Control Channel
- 11.4% Data Encrypted
- 4.5% Data Compressed
- 4.5% Automated Exfiltration



## MITIGATIONS FOR TOP TECHNIQUES

The top ten mitigations shown here are widely effective across the top techniques.\*

### M1017 User Training

Train users to be aware of access or manipulation attempts by an adversary to reduce the risk of successful spearphishing and social engineering.

### M1018 User Account Management

Manage the creation, modification, use, and permissions associated to user accounts.

### M1026 Privileged Account Management

Manage the creation, modification, use, and permissions associated to privileged accounts, including SYSTEM and root.

### M1027 Password Policies

Set and enforce secure password policies for accounts.

### M1028 Operating System Configuration

Make configuration changes to the operating system that result in system hardening against techniques.

### M1030 Network Segmentation

Architect sections of the network to isolate critical systems, functions, or resources. Use physical and logical segmentation to prevent access to sensitive systems and information.

### M1031 Network Intrusion Prevention

Use intrusion detection signatures to block traffic at network boundaries.

### M1032 Multi-factor Authentication

Use two or more pieces of evidence to authenticate to a system.

### M1037 Filter Network Traffic

Use network appliances to filter ingress or egress traffic and perform protocol-based filtering.

### M1042 Disable or Remove Feature or Program

Remove or deny access to unnecessary and potentially vulnerable software to prevent abuse by adversaries.

### M1047 Audit

Perform audits or scans of systems, permissions, software, configurations, etc. to identify potential weaknesses.

\*Top techniques and mitigations vary by sector and environment. Organizations should consider additional attack vectors and mitigation strategies based on their unique environment.