



Threat Hunter Playbook

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Windows

PRE-HUNT ACTIVITIES

Data Management

GUIDED HUNTS

Windows

LSASS Memory Read Access

DLL Process Injection via CreateRemoteThread and LoadLibrary

Active Directory Object Access via Replication Services

Active Directory Root Domain Modification for Replication Services

Registry Modification to Enable Remote Desktop Conections

Local PowerShell Execution

WDigest Downgrade

PowerShell Remote Session

Alternate PowerShell Hosts

Domain DPAPI Backup Key Extraction

SysKey Registry Keys Access

SAM Registry Hive Handle Request

WMI Win32\_Process Class and Create Method for Remote Execution

WMI Eventing

WMI Module Load

Local Service Installation

Remote Service creation

Remote Service Control Manager Handle

Remote Interactive Task Manager LSASS Dump

Registry Modification for Extended NetNTLM Downgrade

Access to Microphone Device

Remote WMI ActiveScriptEventConsumers

Remote DCOM IErtUtil DLL Hijack

Remote WMI Wbemcomn DLL Hijack

SMB Create Remote File

Wuauclt CreateRemoteThread Execution

TUTORIALS

Jupyter Notebooks

Powered by [Jupyter Book](#)

Contents

Hypothesis

Technical Context

Offensive Tradecraft

Pre-Recorded Security Datasets

Analytics

Known Bypasses

False Positives

Hunter Notes

Hunt Output

References

# PowerShell Remote Session

## Hypothesis

Adversaries might be leveraging remote powershell sessions to execute code on remote systems throughout my environment

## Technical Context

## Offensive Tradecraft

Adversaries can use PowerShell to perform a number of actions, including discovery of information and execution of code. In addition, it can be used to execute code remotely via Windows Remote Management (WinRM) services. Therefore, it is important to understand the basic artifacts left when PowerShell is used to execute code remotely via a remote powershell session.

## Pre-Recorded Security Datasets

Metadata	Value
docs	<a href="https://securitydatasets.com/notebooks/atomic/windows/execution/SDWIN-190518211456.html">https://securitydatasets.com/notebooks/atomic/windows/execution/SDWIN-190518211456.html</a>
link	<a href="https://raw.githubusercontent.com/OTRF/Security-Datasets/master/datasets/atomic/windows/lateral_movement/host/empire_psremoting_stager.zip">https://raw.githubusercontent.com/OTRF/Security-Datasets/master/datasets/atomic/windows/lateral_movement/host/empire_psremoting_stager.zip</a>

## Download Dataset

```
import requests
from zipfile import ZipFile
from io import BytesIO

url = 'https://raw.githubusercontent.com/OTRF/Security-Datasets/master/datasets/atomic/windows/execution/SDWIN-190518211456.html'
zipFileRequest = requests.get(url)
zipFile = ZipFile(BytesIO(zipFileRequest.content))
datasetJSONPath = zipFile.extract(zipFile.namelist()[0])
```

## Read Dataset

```
import pandas as pd
from pandas.io import json

df = json.read_json(path_or_buf=datasetJSONPath, lines=True)
```

## Analytics

A few initial ideas to explore your data and validate your detection logic:

### Analytic I

Process wsmprovhost hosts the active remote session on the target. Therefore, it is important to monitor for any the initialization of the PowerShell host wsmprovhost.

Data source	Event Provider	Relationship	Event
Powershell	Windows PowerShell	Application host started	400
Powershell	Microsoft-Windows-PowerShell/Operational	User started Application host	4103

### Logic

```
SELECT `@timestamp`, Hostname, Channel
FROM dataTable
WHERE (Channel = "Microsoft-Windows-PowerShell/Operational" OR Channel = "Windows PowerShell/Operational")
AND (EventID = 400 OR EventID = 4103)
AND Message LIKE "%HostApplication%wsmprovhost%"
```

### Pandas Query

```
(
df[['@timestamp', 'Hostname', 'Channel']]

[(df['Channel'].isin(['Microsoft-Windows-PowerShell/Operational', 'Windows PowerShell']))
 & (df['EventID'].isin([400, 4103]))
 & (df['Message'].str.contains('.*HostApplication.*wsmprovhost.*', regex=True))]
].head()
)
```

### Analytic II

Monitor for any incoming network connection where the destination port is either 5985 or 5986. That will be hosted most likely by the System process.

Data source	Event Provider	Relationship	Event
Process	Microsoft-Windows-Security-Auditing	Process connected to Port	5156

### Logic

```
SELECT `@timestamp`, Hostname, Application, SourceAddress, DestAddress, LayerName, LayerRTID
FROM dataTable
WHERE LOWER(Channel) = "security"
      AND EventID = 5156
      AND (DestPort = 5985 OR DestPort = 5986)
      AND LayerRTID = 44
```

### Pandas Query

```
(
df[['@timestamp', 'Hostname', 'Application', 'SourceAddress', 'DestAddress', 'LayerName', 'LayerRTID']]

[(df['Channel'].str.lower() == 'security')
 & (df['EventID'] == 5156)
 & (
    (df['DestPort'] == 5985)
    | (df['DestPort'] == 5986)
  )
 & (df['LayerRTID'] == 44)
].head()
)
```

### Analytic III

Process wsmprovhost hosts the active remote session on the target. Therefore, from a process creation perspective, it is to document any instances of wsmprovhost being spawned and spawning other processes.

Data source	Event Provider	Relationship	Event
Process	Microsoft-Windows-Security-Auditing	Process created Process	4688

### Logic

```
SELECT `@timestamp`, Hostname, ParentProcessName, NewProcessName
FROM dataTable
WHERE LOWER(Channel) = "security"
      AND EventID = 4688
      AND (ParentProcessName LIKE "%wsmprovhost.exe" OR NewProcessName LIKE "%wsmprovhost.exe")
```

### Pandas Query

```
(
df[['@timestamp', 'Hostname', 'ParentProcessName', 'NewProcessName']]

[(df['Channel'].str.lower() == 'security')
 & (df['EventID'] == 4688)
 & (
    (df['ParentProcessName'].str.lower().str.endswith('wsmprovhost.exe', na=False))
    | (df['NewProcessName'].str.lower().str.endswith('wsmprovhost.exe', na=False))
  )
].head()
)
```

### Analytic IV

Process wsmprovhost hosts the active remote session on the target. Therefore, from a process creation perspective, it is to document any instances of wsmprovhost being spawned and spawning other processes.

Data source	Event Provider	Relationship	Event
Process	Microsoft-Windows-Sysmon/Operational	Process created Process	1

Logic

```
SELECT `@timestamp`, Hostname, ParentImage, Image
FROM dataTable
WHERE Channel = "Microsoft-Windows-Sysmon/Operational"
      AND EventID = 1
      AND (ParentImage LIKE "%wsmprovhost.exe" OR Image LIKE "%wsmprovhost.exe")
```

Pandas Query

```
(
df[['@timestamp','Hostname','ParentImage','Image']]

[(df['Channel'] == 'Microsoft-Windows-Sysmon/Operational')
 & (df['EventID'] == 1)
 & (
    (df['ParentImage'].str.lower().str.endswith('wsmprovhost.exe', na=False))
    | (df['Image'].str.lower().str.endswith('wsmprovhost.exe', na=False))
    )
]
.head()
)
```

Analytic V

Monitor for outbound network connection where the destination port is either 5985 or 5986 and the use is not NT AUTHORITY\NETWORK SERVICE or NT AUTHORITY\SYSTEM.

Data source	Event Provider	Relationship	Event
Process	Microsoft-Windows-Sysmon/Operational	User connected to Port	3

Logic

```
SELECT `@timestamp`, Hostname, User, Initiated, Image, SourceIp, DestinationIp
FROM dataTable
WHERE Channel = "Microsoft-Windows-Sysmon/Operational"
      AND EventID = 3
      AND (DestinationPort = 5985 OR DestinationPort = 5986)
      AND NOT User = "NT AUTHORITY\\\\"NETWORK SERVICE"
```

Pandas Query

```
(
df[['@timestamp','Hostname','User','Initiated','Image','SourceIp','DestinationIp']]

[(df['Channel'] == 'Microsoft-Windows-Sysmon/Operational')
 & (df['EventID'] == 3)
 & (
    (df['DestinationPort'] == 5985)
    | (df['DestinationPort'] == 5986)
    )
 & (~df['User'].isin(['NT AUTHORITY\\\\"NETWORK SERVICE', 'NT AUTHORITY\\\\"SYSTEM']))
]
)
```

Known Bypasses

False Positives

Hunter Notes

- Explore the data produced in your lab environment with the analytics above and document what normal looks like from a PowerShell perspective. Then, take your findings and explore your production environment.
- If powershell activity locally or remotely via winrm happens all the time in your environment, I suggest to categorize the data you collect by business unit or department to document profiles.
- Layer 44 translatest to layer filter FWPM\_LAYER\_ALE\_AUTH\_RECV\_ACCEPT\_V4 / FWPM\_LAYER\_ALE\_AUTH\_RECV\_ACCEPT\_V6. This filtering layer allows for authorizing accept requests for incoming TCP connections, as well as authorizing incoming non-TCP traffic based on the first packet received. Looking for destination ports related to remote PowerShell Sessions and Layer 44 is very helpful.

Hunt Output

Type	Link
Sigma Rule	<a href="https://github.com/SigmaHQ/sigma/blob/master/rules/windows/powershell/powershell_module/posh_pm_remote_powershell_session.yml">https://github.com/SigmaHQ/sigma/blob/master/rules/windows/powershell/powershell_module/posh_pm_remote_powershell_session.yml</a>

Sigma Rule	<a href="https://github.com/SigmaHQ/sigma/blob/master/rules/windows/powershell/powershell_classic/posh_pc_remote_powershell_session.yml">https://github.com/SigmaHQ/sigma/blob/master/rules/windows/powershell/powershell_classic/posh_pc_remote_powershell_session.yml</a>
Sigma Rule	<a href="https://github.com/SigmaHQ/sigma/blob/master/rules/windows/network_connection/sysmon_remote_powershell_session_network.yml">https://github.com/SigmaHQ/sigma/blob/master/rules/windows/network_connection/sysmon_remote_powershell_session_network.yml</a>
Sigma Rule	<a href="https://github.com/SigmaHQ/sigma/blob/master/rules/windows/process_creation/win_remote_powershell_session_process.yml">https://github.com/SigmaHQ/sigma/blob/master/rules/windows/process_creation/win_remote_powershell_session_process.yml</a>
Sigma Rule	<a href="https://github.com/SigmaHQ/sigma/blob/master/rules/windows/builtin/security/win_remote_powershell_session.yml">https://github.com/SigmaHQ/sigma/blob/master/rules/windows/builtin/security/win_remote_powershell_session.yml</a>

## References

- <https://docs.microsoft.com/en-us/powershell/scripting/learn/remoting/running-remote-commands?view=powershell-6#windows-powershell-remoting>
- [https://docs.microsoft.com/en-us/powershell/module/microsoft.powershell.core/about/about\\_remote\\_requirements?view=powershell-6](https://docs.microsoft.com/en-us/powershell/module/microsoft.powershell.core/about/about_remote_requirements?view=powershell-6)
- <https://docs.microsoft.com/en-us/windows/win32/fwp/management-filtering-layer-identifiers->

[Previous](#)  
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[Next](#)  
[Alternate PowerShell Hosts](#)

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