QUALYS SECURITY CONFERENCE 2019

Threat Hunting with Qualys:
Going Beyond Your EDR Solutions

Chris Carlson
VP Strategy, Qualys, Inc.

Adversary Threat Tactics are Changing

Early 2010s

Zero-day Vulnerabilities

(Nation State, Industrial Espionage, Black Market)

Today

Rapidly weaponizing newly-disclosed vulnerabilities

(Good, Fast, Cheap – Pick 3)

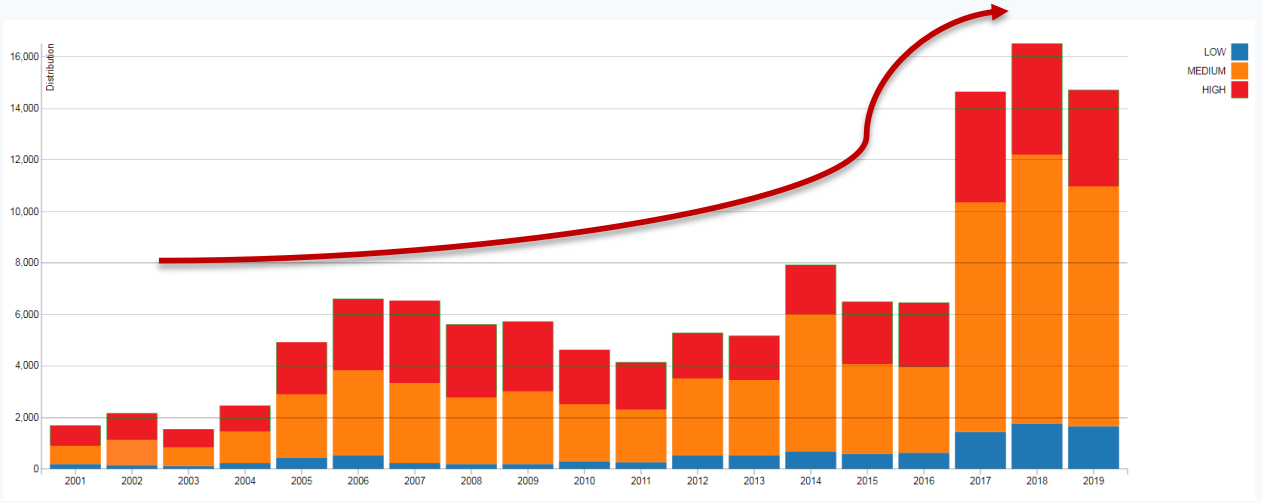
Known Critical Vulnerabilities are Increasing

14-16K vulnerabilities are disclosed 2017-2019

30-40% are ranked as “High” or “Critical” severity

Worm-able Vulnerabilities are increasing (WannaCry, BlueKeep)

“Mean Time to Weaponize” is rapidly decreasing year/year



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Let's Talk About BlueKeep

(RDP Vulnerability)

U.S. Govt Achieves BlueKeep Remote Code Execution, Issues Alert

By Sergiu Gatlan

June 17, 2019 11:13 AM 1

US company selling weaponized BlueKeep exploit

An exploit for a vulnerability that Microsoft feared it may trigger the next WannaCry is now being sold commercially.

By Catalin Cimpanu for Zero Day | July 25, 2019 -- 09:06 GMT (02:06 PDT) | Topic: Security

7/30/2019
12:00 PM

Robert Lemos

BlueKeep Exploits Appear as Security Firms Continue to Worry About Cyberattack

The lack of an attack has puzzled some security experts, but the general advice remains that companies should patch their vulnerable systems more quickly.

Just Two Weeks Ago

EDITOR'S PICK | 380,176 views | Nov 3, 2019, 04:43am

Windows 'BlueKeep' Attack That U.S. Government Warned About Is Happening Right Now

Davey Winder Senior Contributor ⓘ
Cybersecurity
I report and analyse breaking cybersecurity and privacy stories

Get Proactive – Reduce the Attack Surface

AI VM Immediately discover assets and vulnerabilities

PM Notify IT asset owner to patch / stop the instance

PC SCA Change configuration to limit unauthorized access

CSA Control network access / cloud security groups

IOC Add endpoint detection and response

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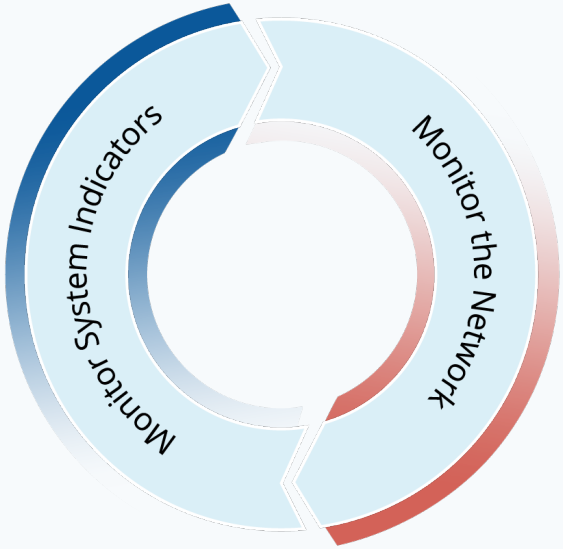
Proactively Hunt, Detect, and Respond

Indication of Compromise

Detect malware, IOCs, IOAs, and verify threat intel



Passive Network Sensor

What new devices are on the network? Are there new/different traffic patterns?

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Qualys IOC – Hunt Using Threat Intel

NotPetya Ransomware spreading using ETERNALBLUE Vulnerability and Credential Stealing

October 6, 2017

On June 27, 2017, NCCIC [13] was notified of Petya malware events occurring in multiple countries and affecting multiple sectors. This variant of the Petya malware—referred to as NotPetya—encrypts files with extensions from a hard-coded list.

Additionally, if the malware gains administrator rights, it encrypts the master boot record (MBR), making the infected Windows computers unusable. NotPetya differs from previous Petya malware primarily in its propagation methods using the ETERNALBLUE vulnerability and credential stealing via a modified version of Mimikatz.

Technical Details

Anti-Virus Coverage

VirusTotal reports 0/66 anti-virus vendors have signatures for the credential stealer as of the date of this report

Files

Delivery – MD5: 71b6a493388e7d0b40c83ce903bc6b04

Installation – MD5: 7e37ab34ecdcc3e77e24522ddfd4852d

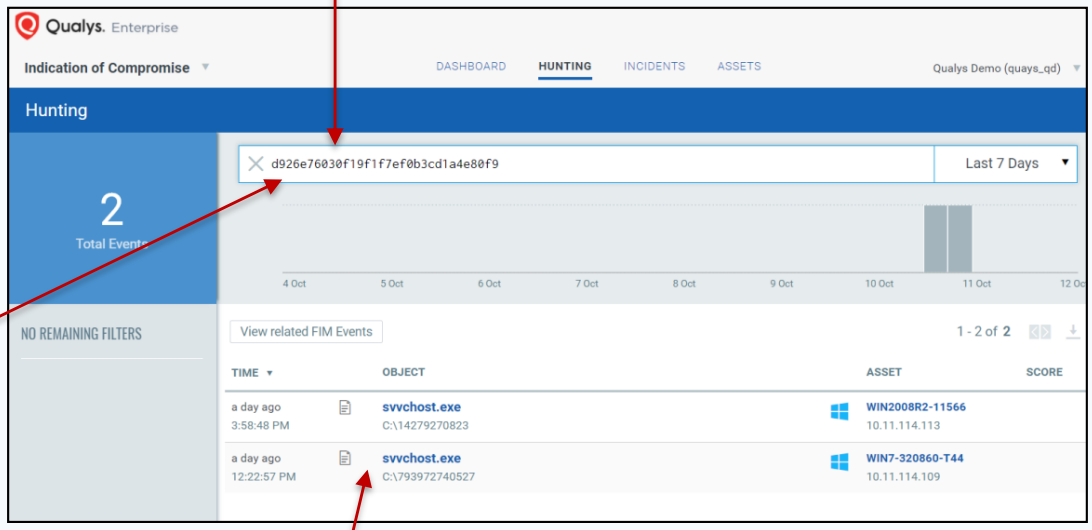
Credential Stealer (new) – MD5: d926e76030f19f1f7ef0b3cd1a4e80f9

Secondary Actions

NotPetya leverages multiple propagation methods to spread within an infected network. According to malware analysis, NotPetya attempts the lateral movement techniques below:

1 Threat intelligence lists attack information …

2 Search for the file hash here…



3 Find the object there.

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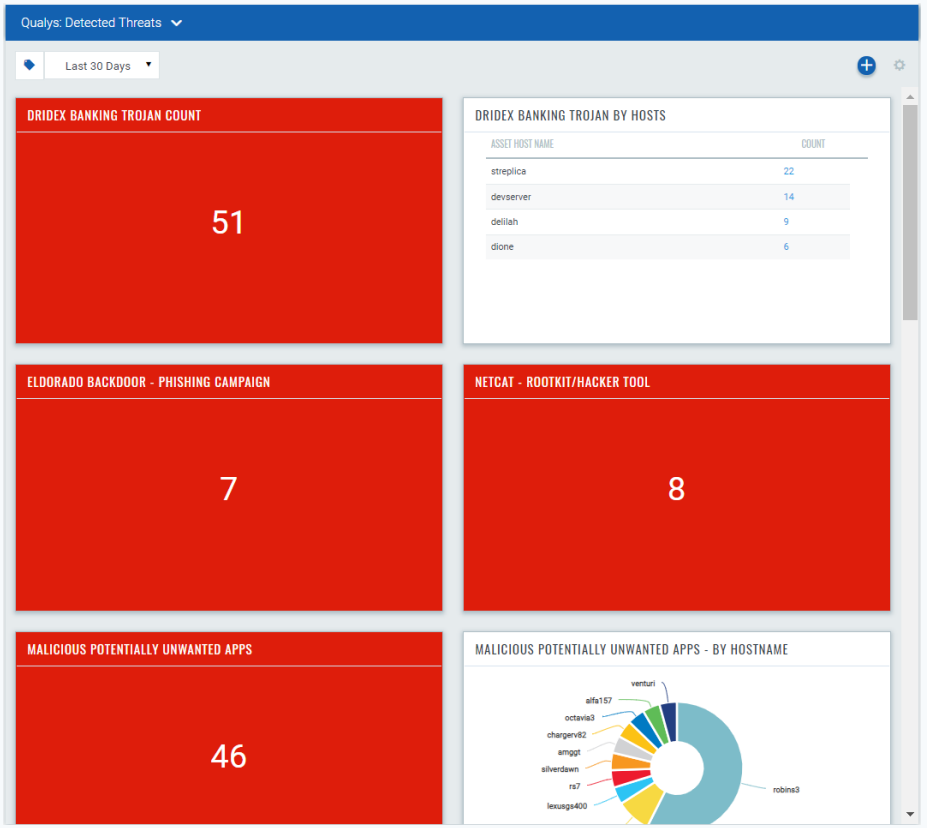
Detect Malware Missed by Anti-Virus

UK Government Contractor

- “Big 4” anti-virus installed
- Qualys Agent for Vulnerability Mgmt
- Added Qualys IOC on existing agents
- 256 hosts

Qualys IOC discovered…

- Dridex Banking Trojan (51)
- 4 domain controllers infected
- Backdoors (7) installed due to phishing campaigns
- Netcat (8) root kits installed
- 46 PUAs installed



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Demo

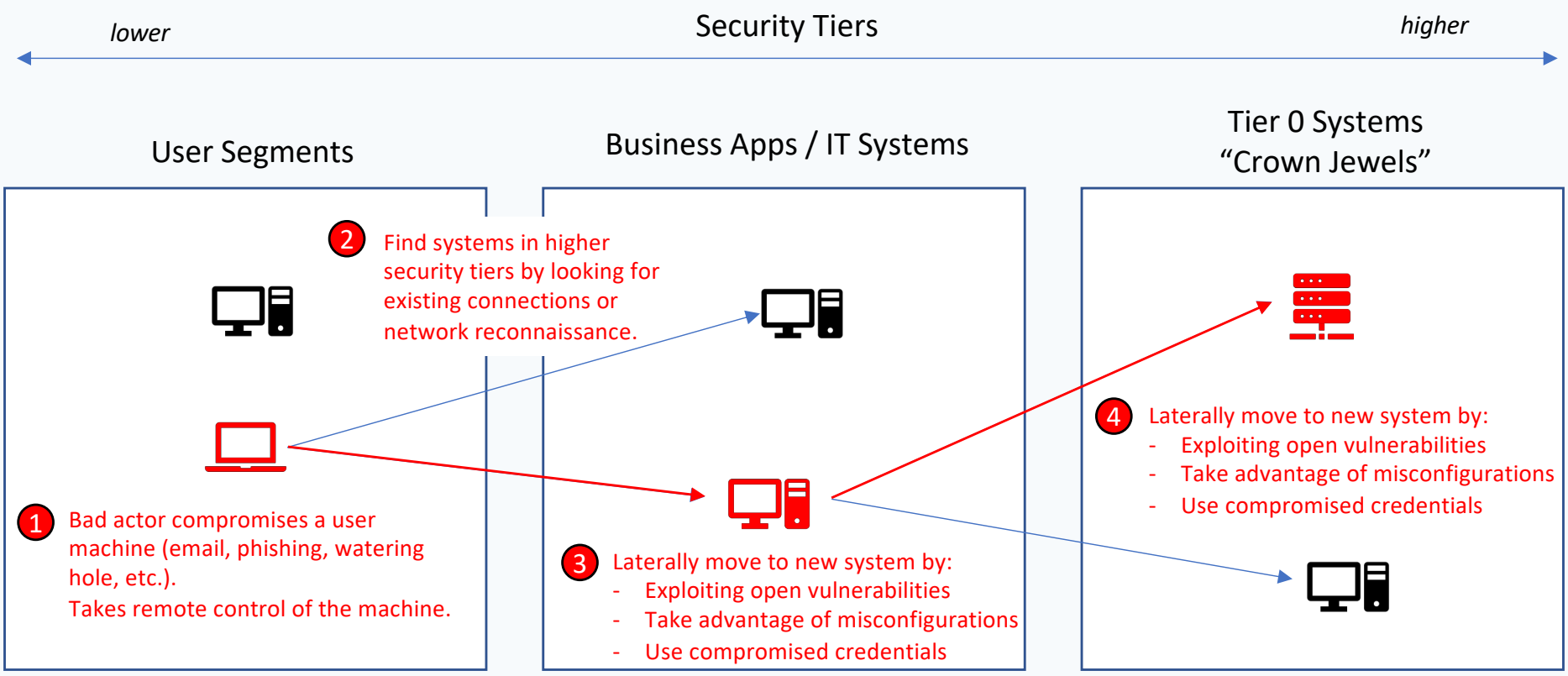
9aa730979342f8d719e730f1a2081d8e9852da646ce2fbd9ce5e5301de25a5c5

Beyond Endpoint Detection and Response:
How can I better protect my crown jewels?

Threat Hunting Assumptions:

- Every user machine can be compromised – it only takes one
- Every Remote Code Execution (RCE) vulnerability can be exploited
- Local Privilege Escalation and Credential Harvesting to move laterally
- System misconfigurations are often overlooked and easy to exploit
- Network segmentation is rarely used internally due to management
- All attacks are not equal: can Adversaries reach my Critical Servers?

Adversary Lateral Movements (Attack Paths)



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Finding Attack Paths

Network Reachability

Determine connections between hosts using Cloud Agent CA

Passive + Active network collection

Store these connections in a Graph Database for fast query

+

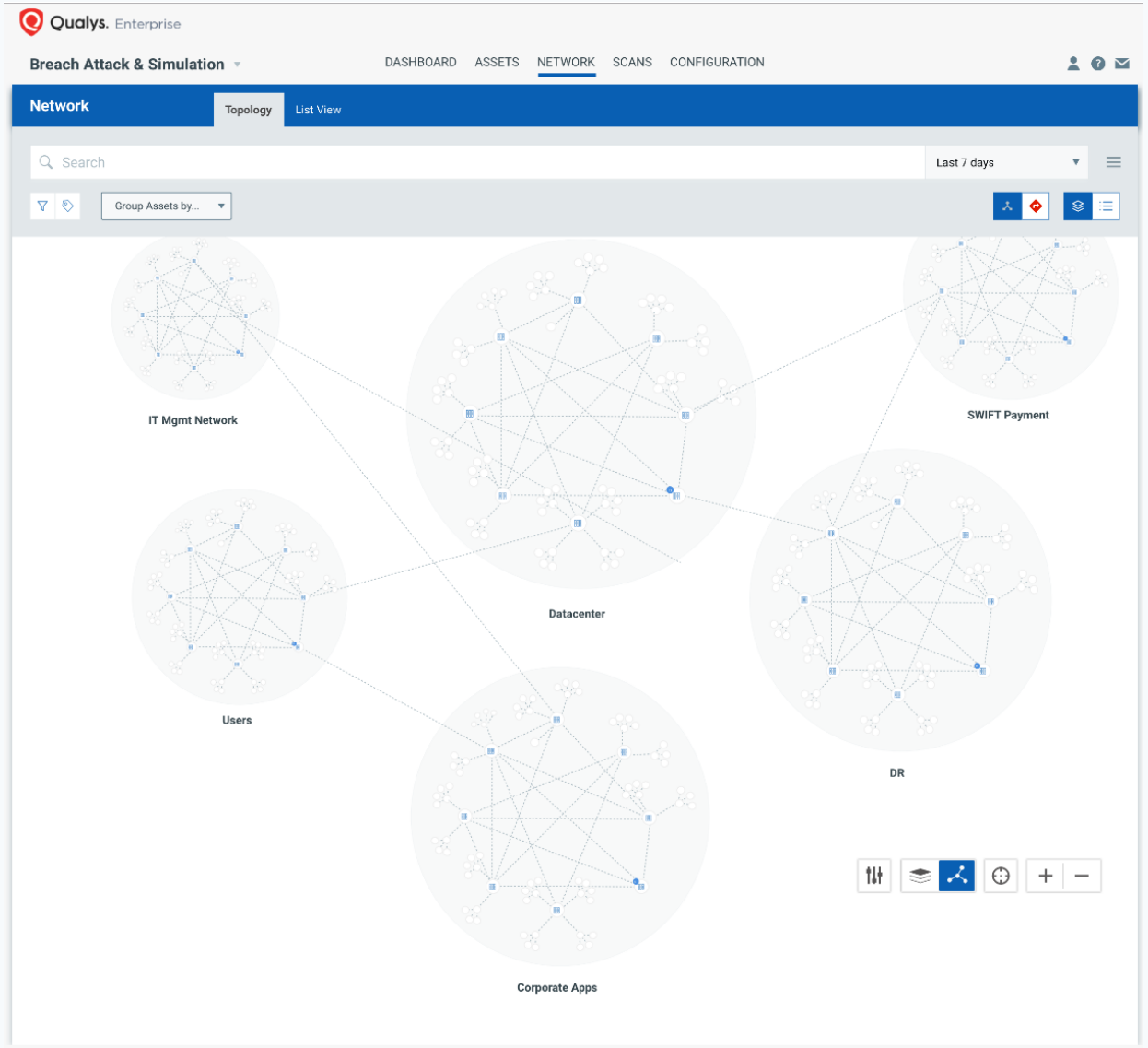
Asset Security Posture

Remote Code Execution Vulnerabilities VM TP

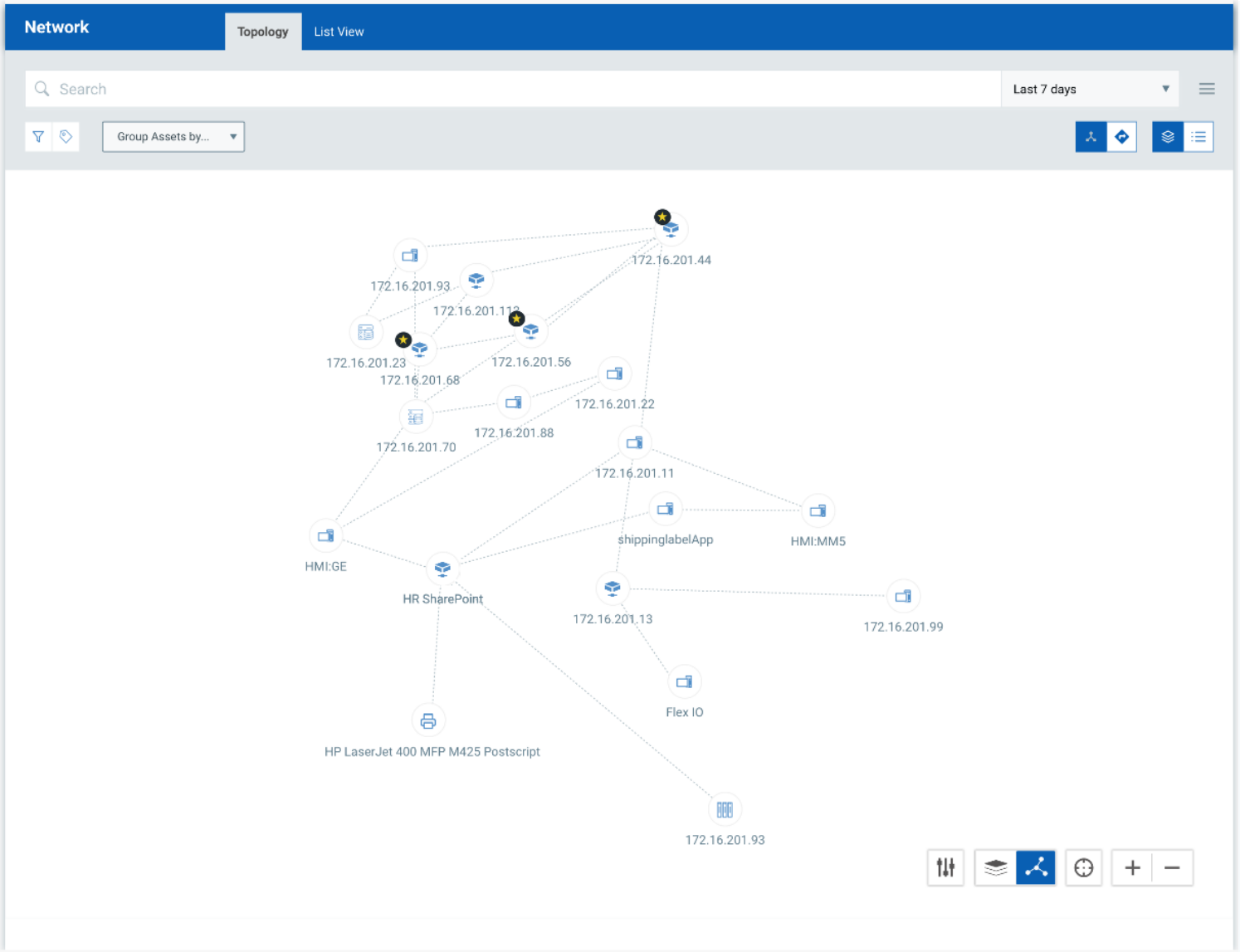
System Misconfigurations PC SCA

Malware and Indicators of Activity IOC

Attack Path Discovery to Prioritize Patching and Improve Security Defenses


Qualys. Enterprise
Breach Attack & Simulation
DASHBOARD
ASSETS
NETWORK
SCANS
CONFIGURATION
Network
Topology
List View
Search
Last 7 days
Group Assets by...
IT Mgmt Network
Datacenter
SWIFT Payment
Users
DR
Corporate Apps

Qualys.


Network
Topology
List View
Search
Last 7 days
Group Assets by...
172.16.201.44
172.16.201.93
172.16.201.113
172.16.201.23
172.16.201.68
172.16.201.56
172.16.201.22
172.16.201.88
172.16.201.70
172.16.201.11
shippinglabelApp
HMI:MM5
HMI:GE
HR SharePoint
172.16.201.13
172.16.201.99
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93

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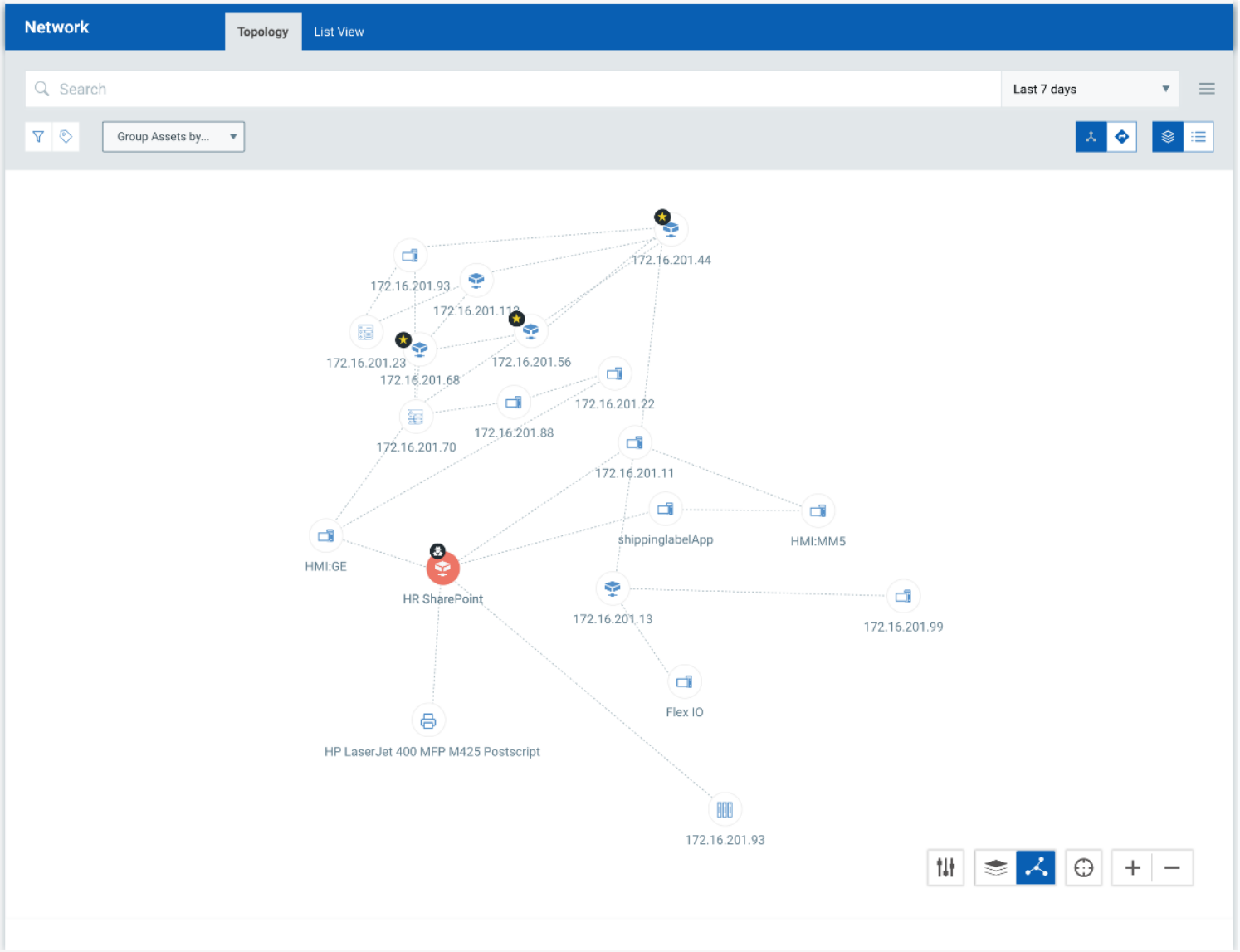
Network
Topology
List View
Search
Last 7 days
Group Assets by...
172.16.201.44
172.16.201.93
172.16.201.112
172.16.201.23
172.16.201.68
172.16.201.56
172.16.201.22
172.16.201.88
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HMI:MM5
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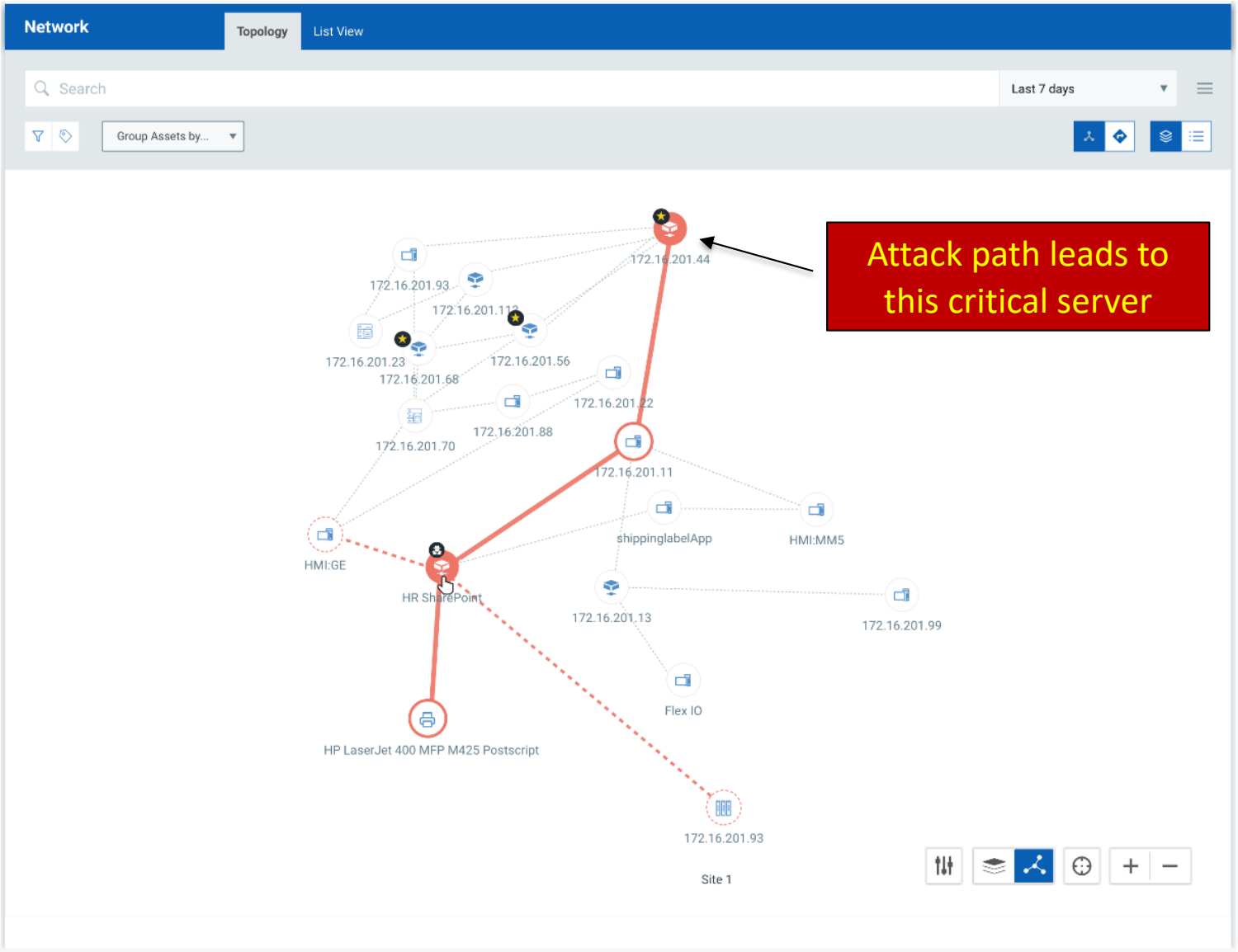
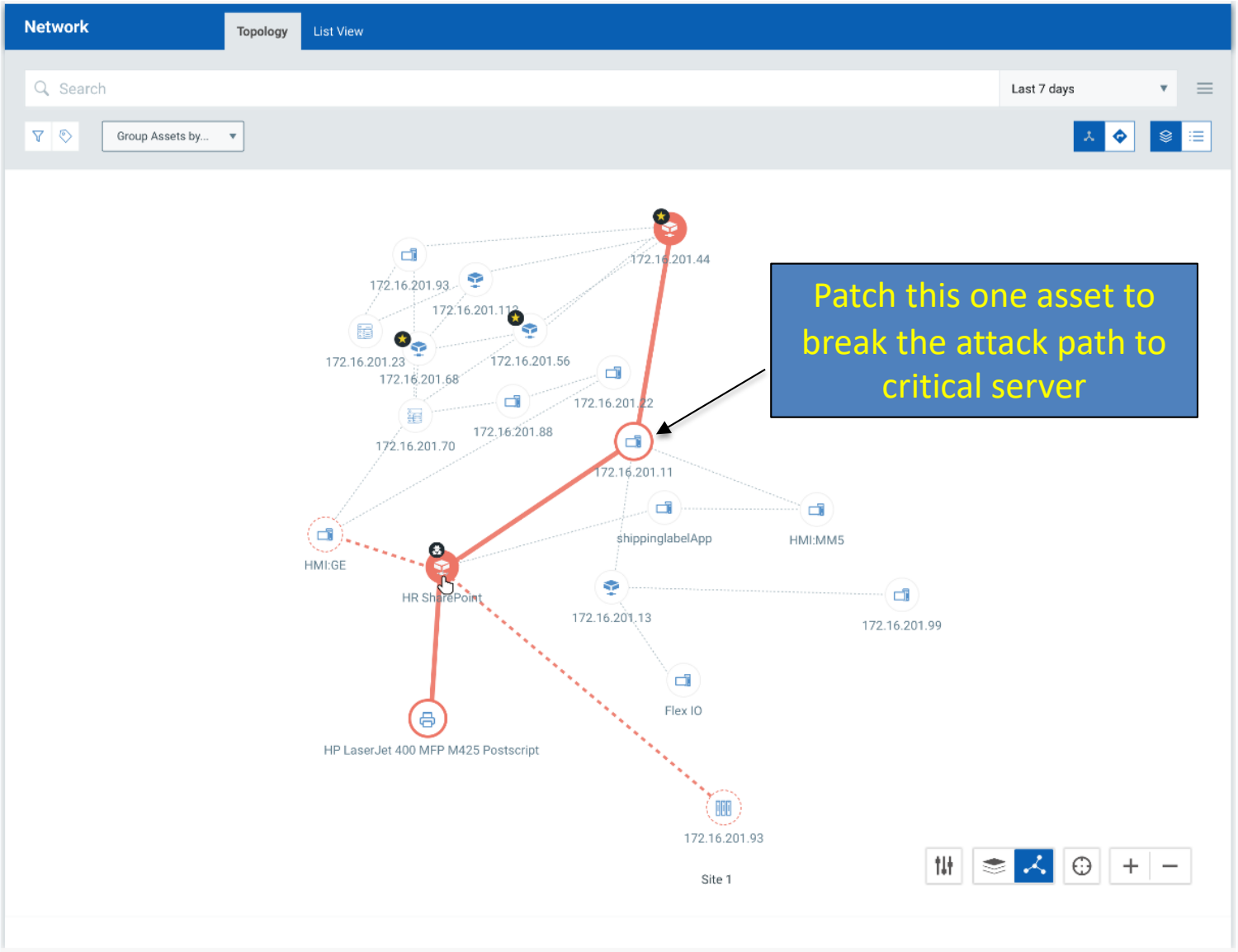
172.16.201.13
172.16.201.99
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93

Qualys.


Network
Topology
List View
Search
Last 7 days
Group Assets by...
Attack path leads to this critical server
172.16.201.44
172.16.201.93
172.16.201.113
172.16.201.23
172.16.201.68
172.16.201.56
172.16.201.22
172.16.201.88
172.16.201.70
172.16.201.11
shippinglabelApp
HMI:MM5
HMI:GE
HR SharePoint
172.16.201.13
172.16.201.99
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93
Site 1

Qualys.


Network
Topology
List View
Search
Last 7 days
Group Assets by...
172.16.201.44
172.16.201.93
172.16.201.113
172.16.201.23
172.16.201.68
172.16.201.56
172.16.201.22
172.16.201.88
172.16.201.70
172.16.201.11
Patch this one asset to break the attack path to critical server
shippinglabelApp
HMI:MM5
HMI:GE
HR SharePoint
172.16.201.13
172.16.201.99
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93
Site 1

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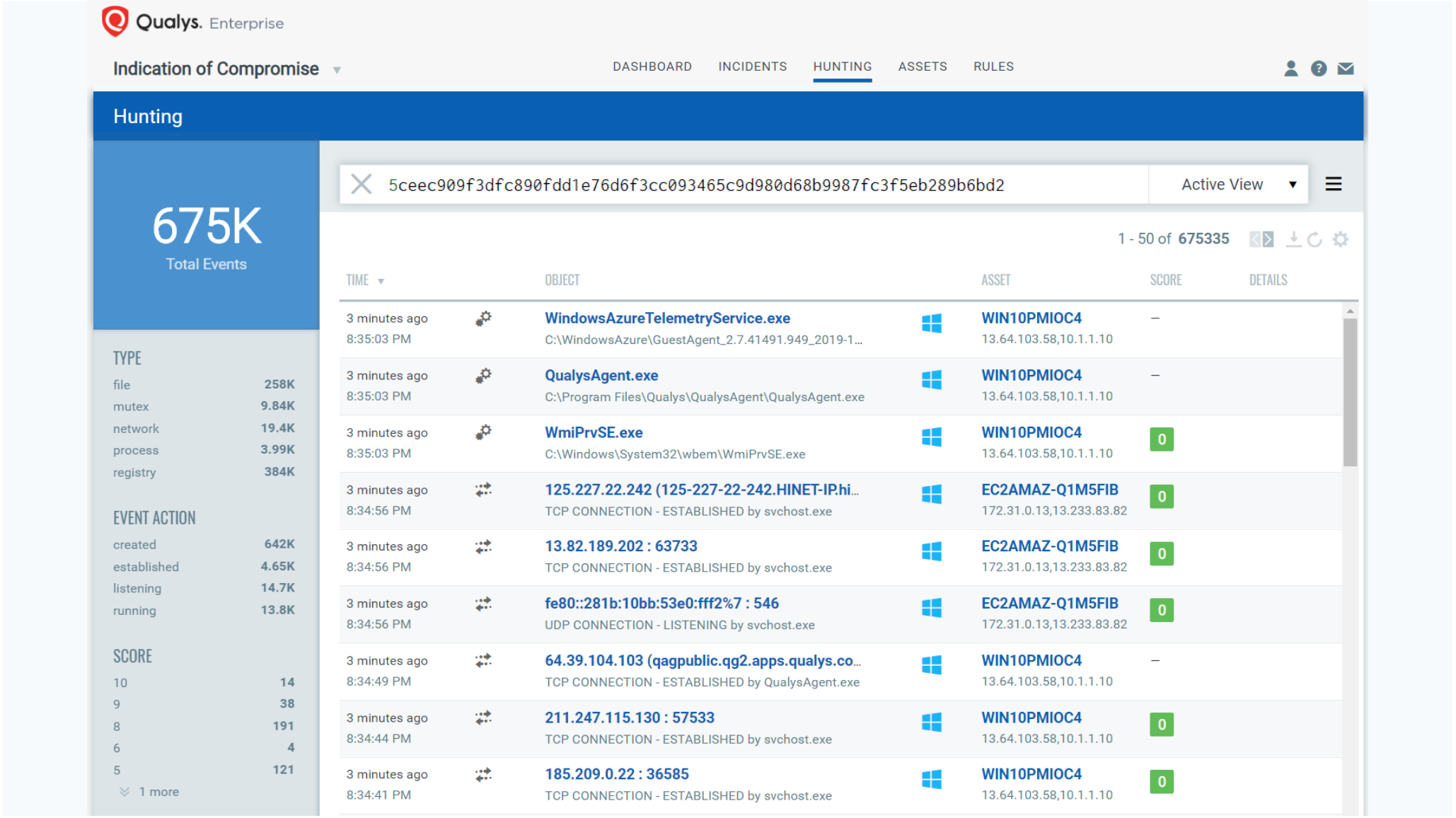
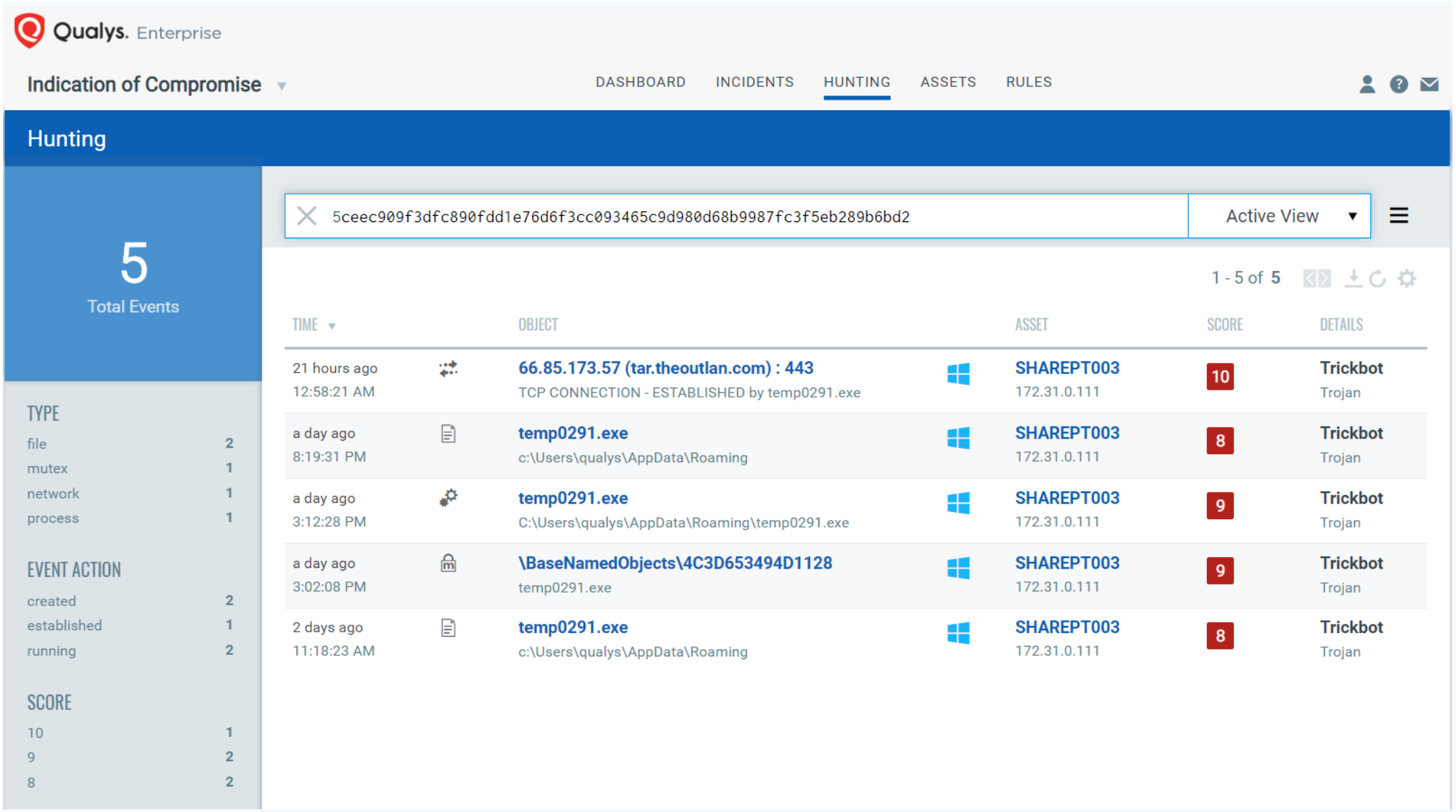
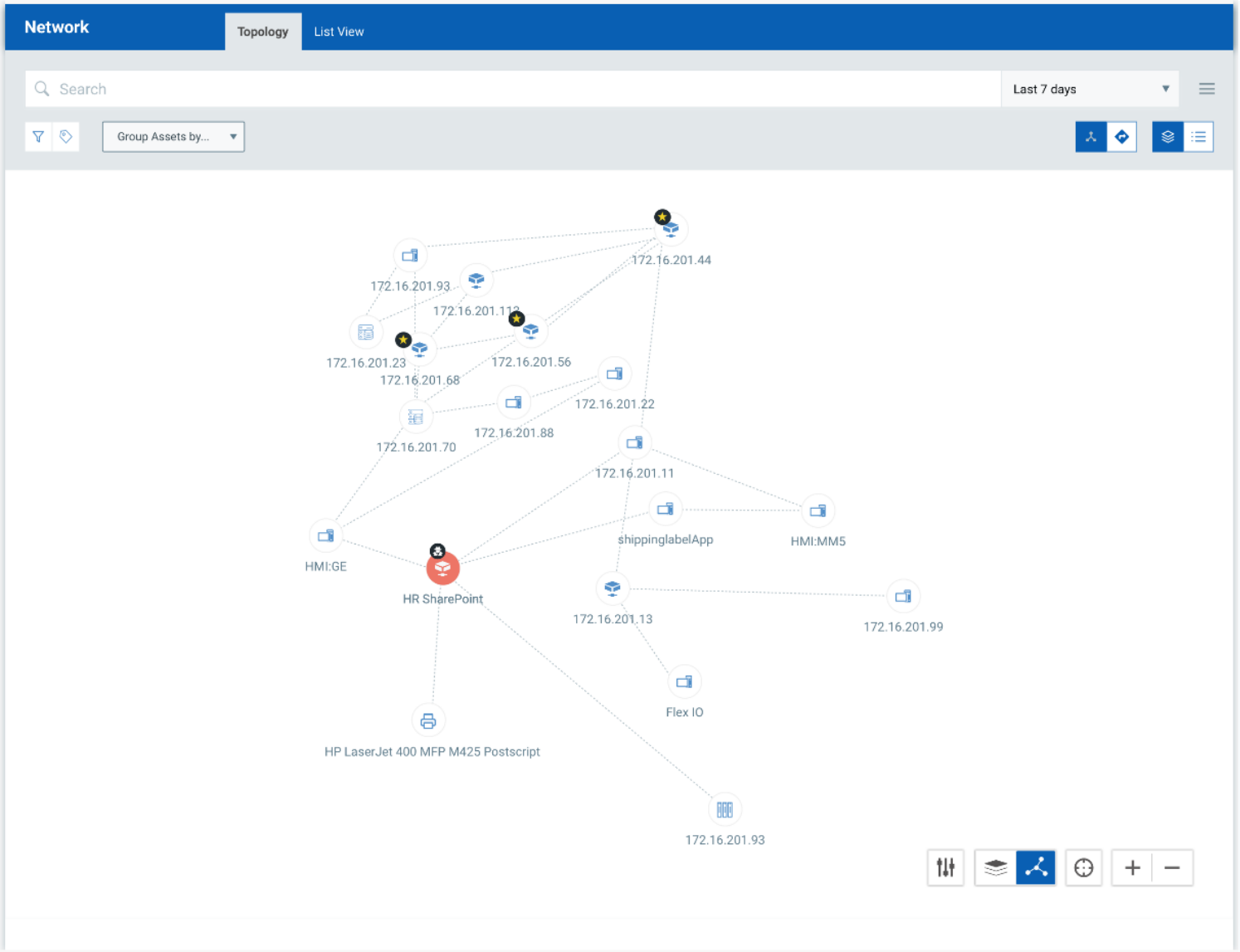
Attack Path Discovery for Proactive Threat Hunting and Response Priority


Qualys. Enterprise
Indication of Compromise
DASHBOARD
INCIDENTS
HUNTING
ASSETS
RULES
Hunting
675K
Total Events
5ceec909f3dfc890fdd1e76d6f3cc093465c9d980d68b9987fc3f5eb289b6bd2
Active View
1 - 50 of 675335
TIME
OBJECT
ASSET
SCORE
DETAILS
TYPE
file 258K
mutex 9.84K
network 19.4K
process 3.99K
registry 384K
EVENT ACTION
created 642K
established 4.65K
listening 14.7K
running 13.8K
SCORE
10 14
9 38
8 191
6 4
5 121
1 more
3 minutes ago
8:35:03 PM
WindowsAzureTelemetryService.exe
C:\WindowsAzure\GuestAgent_2.7.41491.949_2019-1...
WIN10PMIOC4
13.64.103.58,10.1.1.10
3 minutes ago
8:35:03 PM
QualysAgent.exe
C:\Program Files\Qualys\QualysAgent\QualysAgent.exe
WIN10PMIOC4
13.64.103.58,10.1.1.10
3 minutes ago
8:35:03 PM
WmiPrvSE.exe
C:\Windows\System32\wbem\WmiPrvSE.exe
WIN10PMIOC4
13.64.103.58,10.1.1.10
0
3 minutes ago
8:34:56 PM
125.227.22.242 (125-227-22-242.HINET-IP.hi...
TCP CONNECTION - ESTABLISHED by svchost.exe
EC2AMAZ-Q1M5FIB
172.31.0.13,13.233.83.82
0
3 minutes ago
8:34:56 PM
13.82.189.202 : 63733
TCP CONNECTION - ESTABLISHED by svchost.exe
EC2AMAZ-Q1M5FIB
172.31.0.13,13.233.83.82
0
3 minutes ago
8:34:56 PM
fe80::281b:10bb:53e0:fff2%7 : 546
UDP CONNECTION - LISTENING by svchost.exe
EC2AMAZ-Q1M5FIB
172.31.0.13,13.233.83.82
0
3 minutes ago
8:34:49 PM
64.39.104.103 (qagpublic.qg2.apps.qualys.co...
TCP CONNECTION - ESTABLISHED by QualysAgent.exe
WIN10PMIOC4
13.64.103.58,10.1.1.10
3 minutes ago
8:34:44 PM
211.247.115.130 : 57533
TCP CONNECTION - ESTABLISHED by svchost.exe
WIN10PMIOC4
13.64.103.58,10.1.1.10
0
3 minutes ago
8:34:41 PM
185.209.0.22 : 36585
TCP CONNECTION - ESTABLISHED by svchost.exe
WIN10PMIOC4
13.64.103.58,10.1.1.10
0


Qualys. Enterprise
Indication of Compromise
DASHBOARD
INCIDENTS
HUNTING
ASSETS
RULES
Hunting
5
Total Events
TYPE
file 2
mutex 1
network 1
process 1
EVENT ACTION
created 2
established 1
running 2
SCORE
10 1
9 2
8 2
5ceec909f3dfc890fdd1e76d6f3cc093465c9d980d68b9987fc3f5eb289b6bd2
Active View
1 - 5 of 5
TIME
OBJECT
ASSET
SCORE
DETAILS
21 hours ago
12:58:21 AM
66.85.173.57 (tar.theoutlan.com) : 443
TCP CONNECTION - ESTABLISHED by temp0291.exe
SHAREPT003
172.31.0.111
10
Trickbot
Trojan
a day ago
8:19:31 PM
temp0291.exe
c:\Users\qualys\AppData\Roaming
SHAREPT003
172.31.0.111
8
Trickbot
Trojan
a day ago
3:12:28 PM
temp0291.exe
C:\Users\qualys\AppData\Roaming\temp0291.exe
SHAREPT003
172.31.0.111
9
Trickbot
Trojan
a day ago
3:02:08 PM
\BaseNamedObjects\4C3D653494D1128
temp0291.exe
SHAREPT003
172.31.0.111
9
Trickbot
Trojan
2 days ago
11:18:23 AM
temp0291.exe
c:\Users\qualys\AppData\Roaming
SHAREPT003
172.31.0.111
8
Trickbot
Trojan


Network
Topology
List View
Search
Last 7 days
Group Assets by...
172.16.201.44
172.16.201.93
172.16.201.112
172.16.201.23
172.16.201.68
172.16.201.56
172.16.201.22
172.16.201.88
172.16.201.70
172.16.201.11
shippinglabelApp
HMI:MM5
HMI:GE
HR SharePoint
172.16.201.13
172.16.201.99
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93

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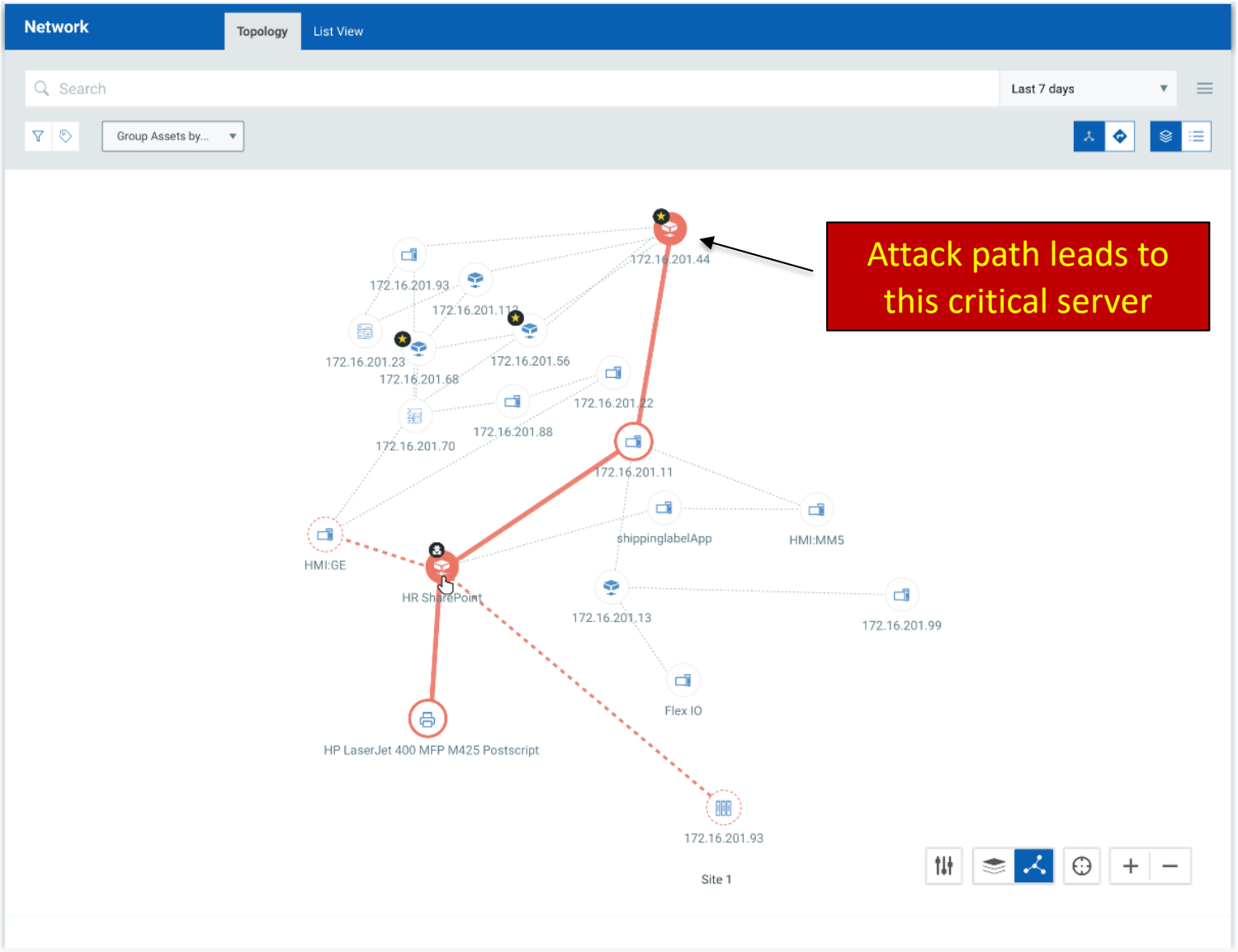
Network
Topology
List View
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Last 7 days
Group Assets by...
Attack path leads to this critical server
172.16.201.44
172.16.201.93
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172.16.201.88
172.16.201.70
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HMI:MM5
HMI:GE
HR SharePoint
172.16.201.13
172.16.201.99
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93
Site 1

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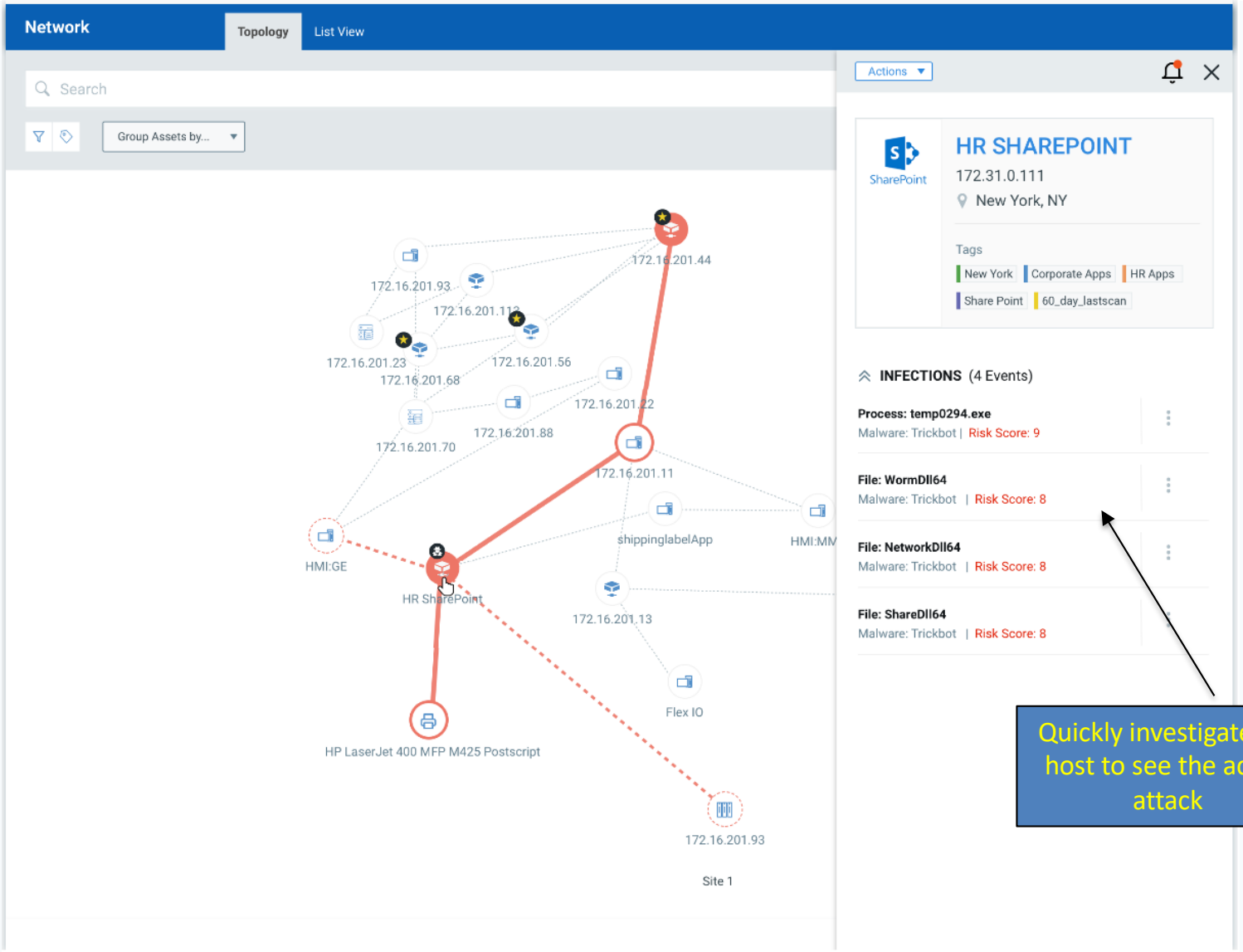
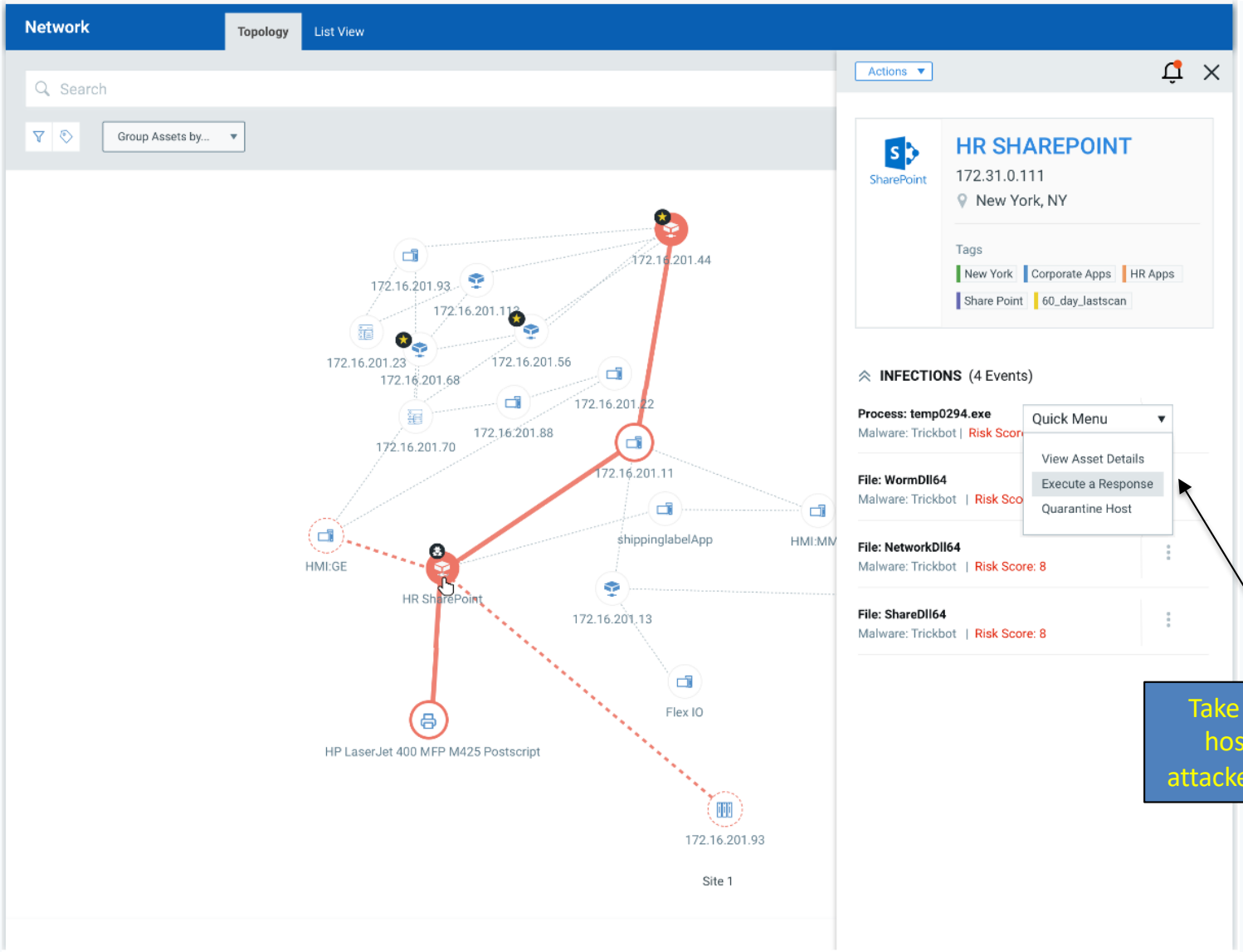

Network
Topology
List View
Search
Group Assets by...
172.16.201.44
172.16.201.93
172.16.201.113
172.16.201.23
172.16.201.68
172.16.201.56
172.16.201.22
172.16.201.88
172.16.201.70
172.16.201.11
shippinglabelApp
HMI:MM
HMI:GE
HR SharePoint
172.16.201.13
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93
Site 1
Actions
SharePoint
HR SHAREPOINT
172.31.0.111
New York, NY
Tags
New York
Corporate Apps
HR Apps
Share Point
60_day_lastscan
INFECTIONS (4 Events)
Process: temp0294.exe
Malware: Trickbot | Risk Score: 9
File: WormDll64
Malware: Trickbot | Risk Score: 8
File: NetworkDll64
Malware: Trickbot | Risk Score: 8
File: ShareDll64
Malware: Trickbot | Risk Score: 8
Quickly investigate the host to see the active attack


Network
Topology
List View
Search
Group Assets by...
172.16.201.44
172.16.201.93
172.16.201.113
172.16.201.23
172.16.201.68
172.16.201.56
172.16.201.22
172.16.201.88
172.16.201.70
172.16.201.11
shippinglabelApp
HMI:MM
HMI:GE
HR SharePoint
172.16.201.13
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93
Site 1
Actions
SharePoint
HR SHAREPOINT
172.31.0.111
New York, NY
Tags
New York
Corporate Apps
HR Apps
Share Point
60_day_lastscan
INFECTIONS (4 Events)
Process: temp0294.exe
Malware: Trickbot | Risk Score
Quick Menu
View Asset Details
Execute a Response
Quarantine Host
File: WormDll64
Malware: Trickbot | Risk Sco
File: NetworkDll64
Malware: Trickbot | Risk Score: 8
File: ShareDll64
Malware: Trickbot | Risk Score: 8
Take action on this host to stop the attacker in their tracks
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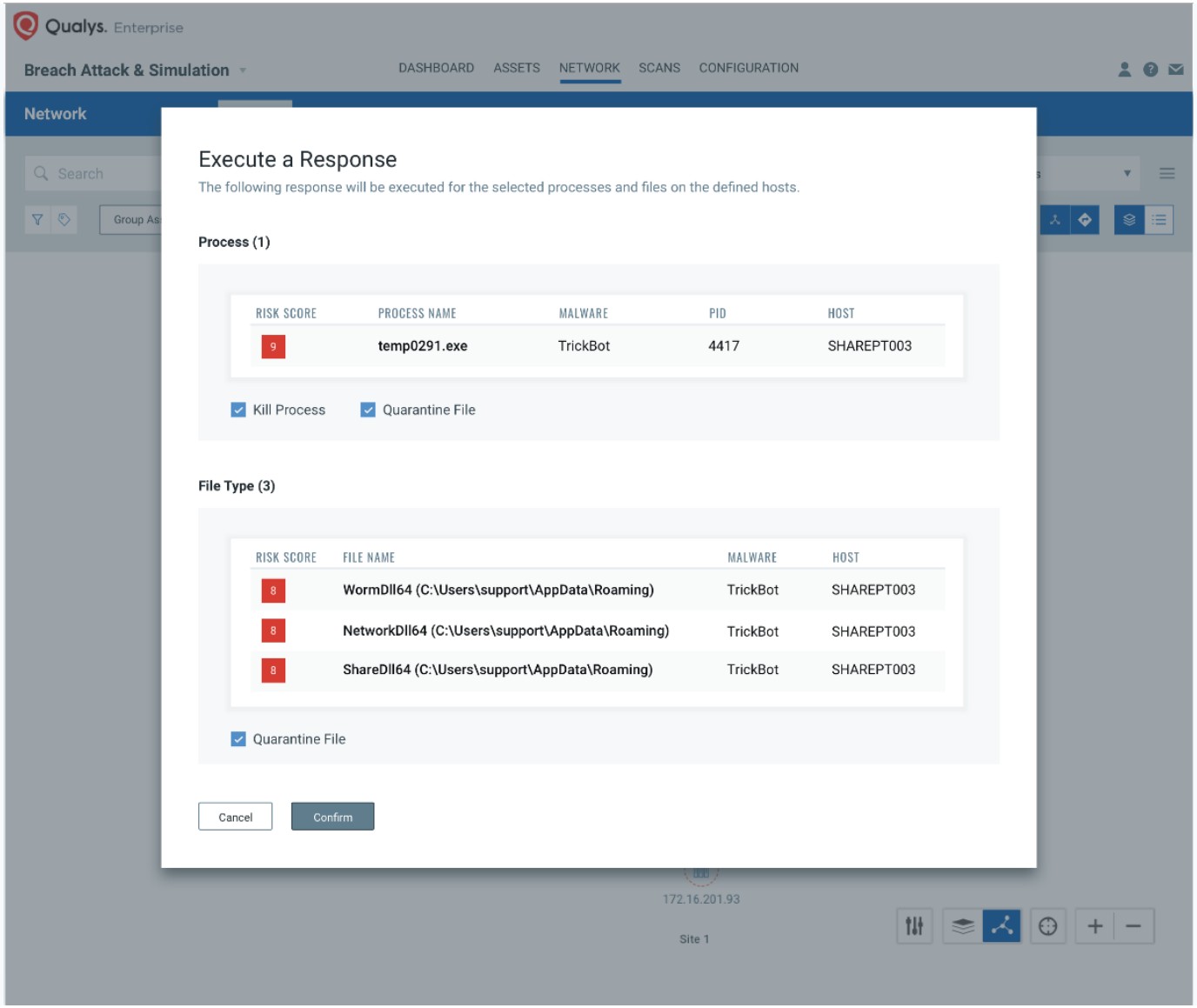
Qualys. Enterprise
Breach Attack & Simulation
DASHBOARD
ASSETS
NETWORK
SCANS
CONFIGURATION
Network
Search
Execute a Response
The following response will be executed for the selected processes and files on the defined hosts.
Process (1)
RISK SCORE
PROCESS NAME
MALWARE
PID
HOST
9
temp0291.exe
TrickBot
4417
SHAREPT003
Kill Process
Quarantine File
File Type (3)
RISK SCORE
FILE NAME
MALWARE
HOST
8
WormDll64 (C:\Users\support\AppData\Roaming)
TrickBot
SHAREPT003
8
NetworkDll64 (C:\Users\support\AppData\Roaming)
TrickBot
SHAREPT003
8
ShareDll64 (C:\Users\support\AppData\Roaming)
TrickBot
SHAREPT003
Quarantine File
Cancel
Confirm
172.16.201.93
Site 1

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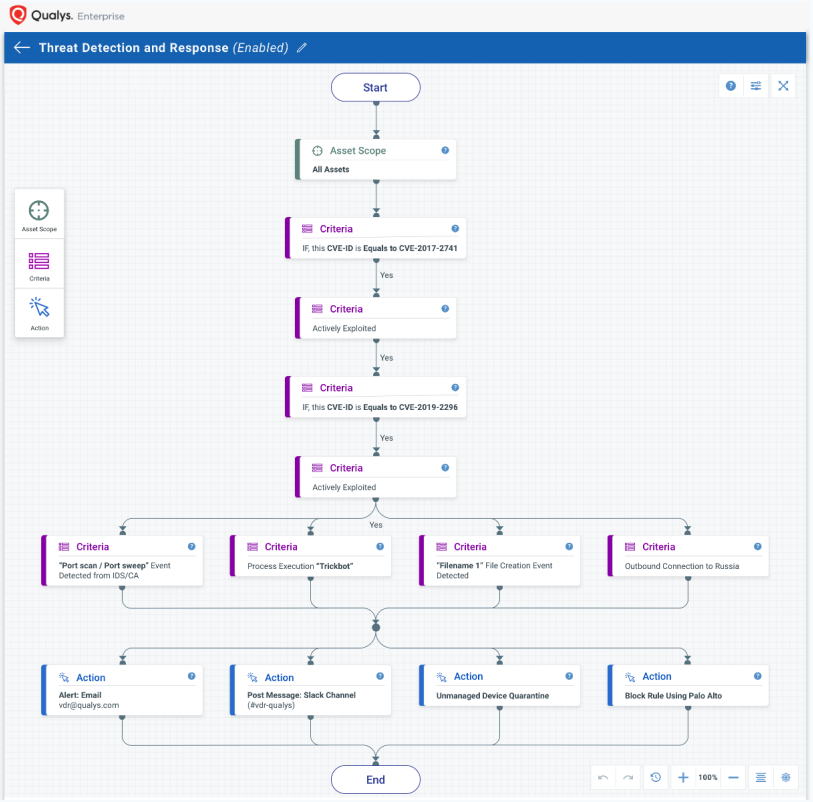
Scale Human Response with Automation

Find active attacks on endpoint using Indication of Compromise

Go beyond endpoint detection with Security Analytics – correlate user, network, application, cloud, container

Use attack path discovery as metadata to detect active attacks reaching critical assets

Automate response to protect critical assets using response playbooks



Qualys.

Thank You

Chris Carlson
ccarlson@qualys.com