Threat Hunting with Qualys:
Going Beyond Your EDR Solutions

Chris Carlson
VP Product Management, 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)

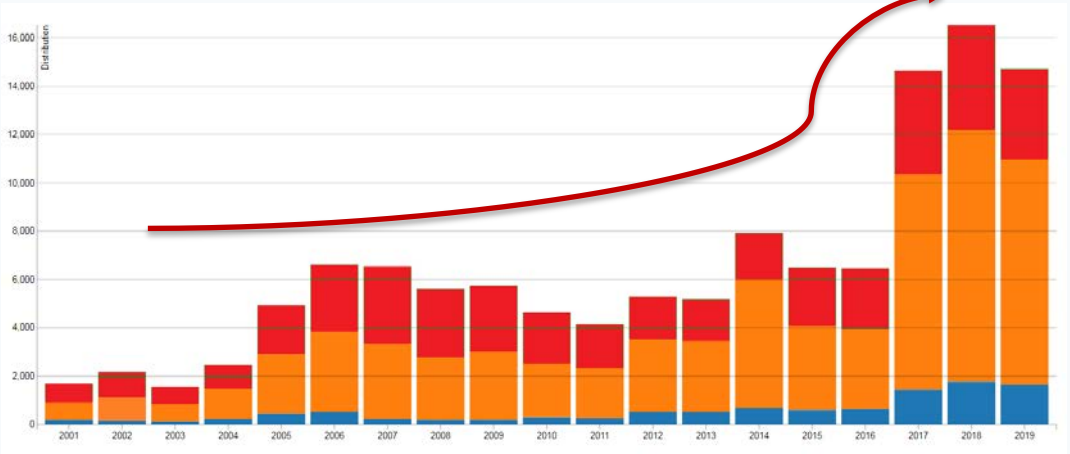
Known Critical Vulnerabilities are Increasing

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

June 2019

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

July 2019

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.

Aug 2019

November 2019

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

This week Tuesday!

Qualys. Community

Discussions Blog Training Docs

Microsoft Windows CryptoAPI Spoofing Vulnerability (CVE-2020-0601) – How to Detect and Remediate

Posted by Animesh Jain in The Laws of Vulnerabilities on January 14, 2020

This is a serious vulnerability and patches should be applied immediately. An attacker could exploit this vulnerability by using a spoofed code-signing certificate, meaning an attacker could let you download and install malware that pretended to be something legit, such as software updates, due to the spoofed digital signature.

certificate, meaning an attacker could let you download and install malware that pretended to be something legit, such as software updates, due to the spoofed digital signature. Examples where validation of trust may be impacted include:

Exploits/PoC:

There are no reports of active exploitation or PoC available in public domain at this point of time. However, per NSA advisory *“Remote exploitation tools will likely be made quickly and widely available.”*

will likely be made quickly and widely available."

Get Proactive – Reduce the Attack Surface

AI VM Immediately discover assets and vulnerabilities

PM Patch and verify remediation / stop the instance

PC SCA Change configuration to limit unauthorized access

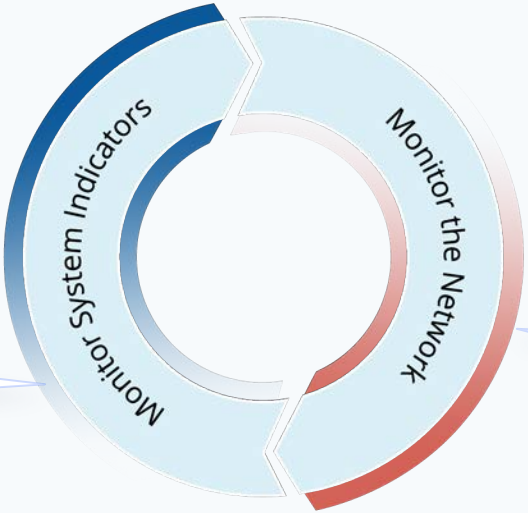
CSA Control network access / cloud security groups

IOC Add Endpoint Detection and Response

Proactively Hunt, Detect, and Respond

Indication of Compromise

Detect malware, IOCs, IOAs, and verify threat intel



Security Analytics

(Summer 2020)

Augment SIEMs by finding attacks using behavioral analytics and MITRE ATT&CK

Qualys.

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

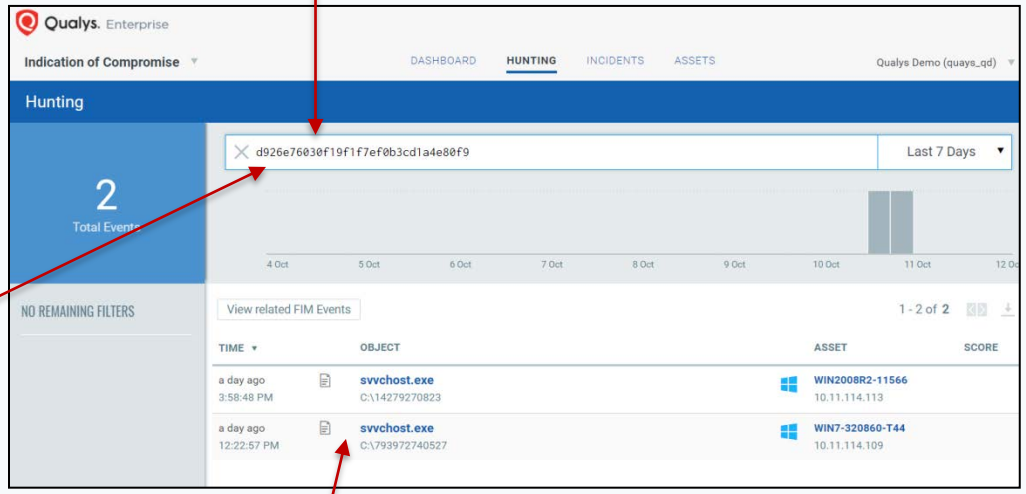
Credential Stealer (new) – MD5: d926e76030f19f1f7ef0b3cd1a4e80f9

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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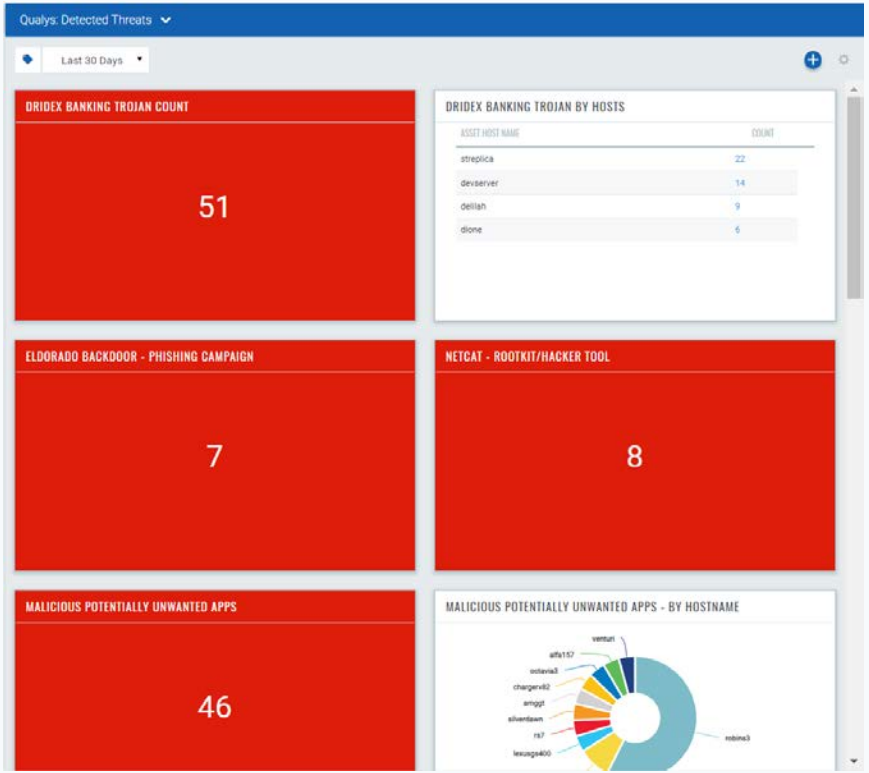
Detect Malware Missed by Anti-Virus

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

a0c68e476f55d0b7cdd87b1b20a1e021672eec41f96e056d6289d8734491f9bb

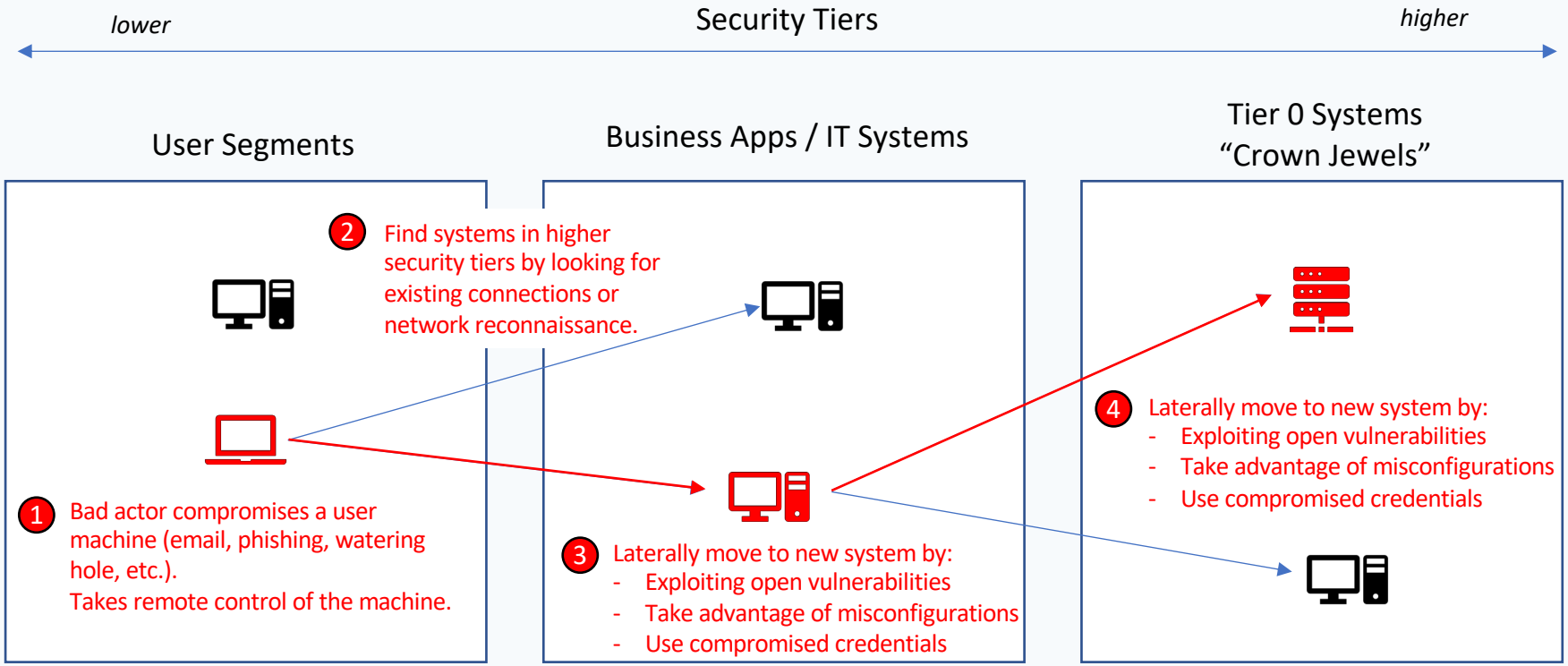
Beyond Endpoint Detection and Response:
How can I better protect my crown jewels?

Threat Hunting Assumptions:

- Every user machine can be compromised – it only takes one click
- 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)



Attack Path Discovery *(Summer 2020)*

Network Reachability

Determine connections between hosts using Cloud Agent CA

Passive + Active network collection

Store these connections in a Graph Database for fast query

+

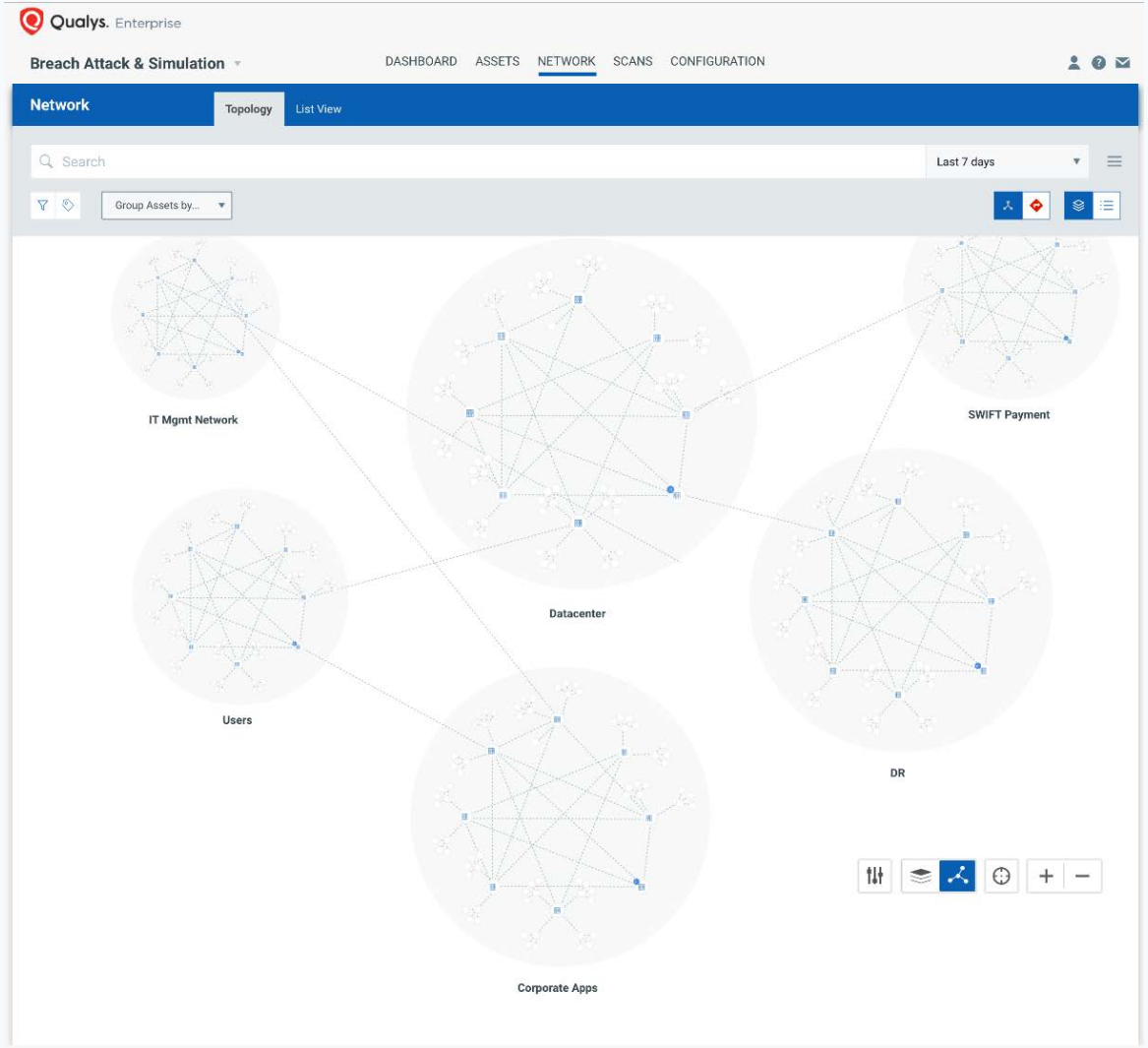
Asset Security Posture

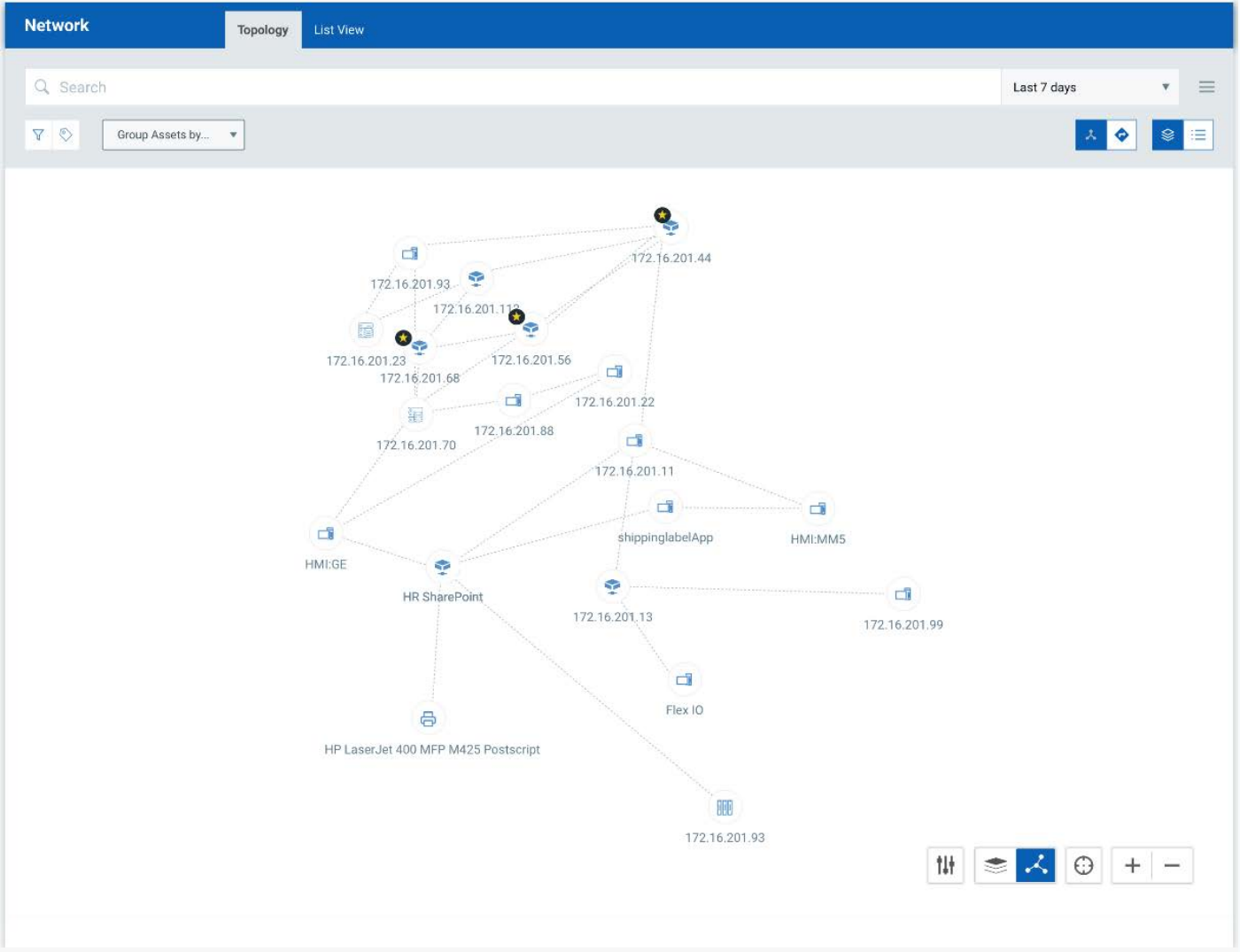
Remotely Exploitable Vulnerabilities VM TP

System Misconfigurations PC SCA

Malware, IoCs, and Indicators of Activity IOC

Qualys.


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


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
172.16.201.56
172.16.201.68
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

Attack Path Discovery for Proactive Threat Hunting and Response Priority

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Indication of Compromise

DASHBOARD INCIDENTS HUNTING ASSETS RULES

Hunting

675K
Total Events

5ceec909f3dfc890fdd1e76d6f3cc093465c9d980d68b9987fc3f5eb289b6bd2

Active View

1 - 50 of **675335**

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

TIME	OBJECT	ASSET	SCORE	DETAILS
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	

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Indication of Compromise

DASHBOARD INCIDENTS HUNTING ASSETS RULES

Hunting

5
Total Events

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

TYPE

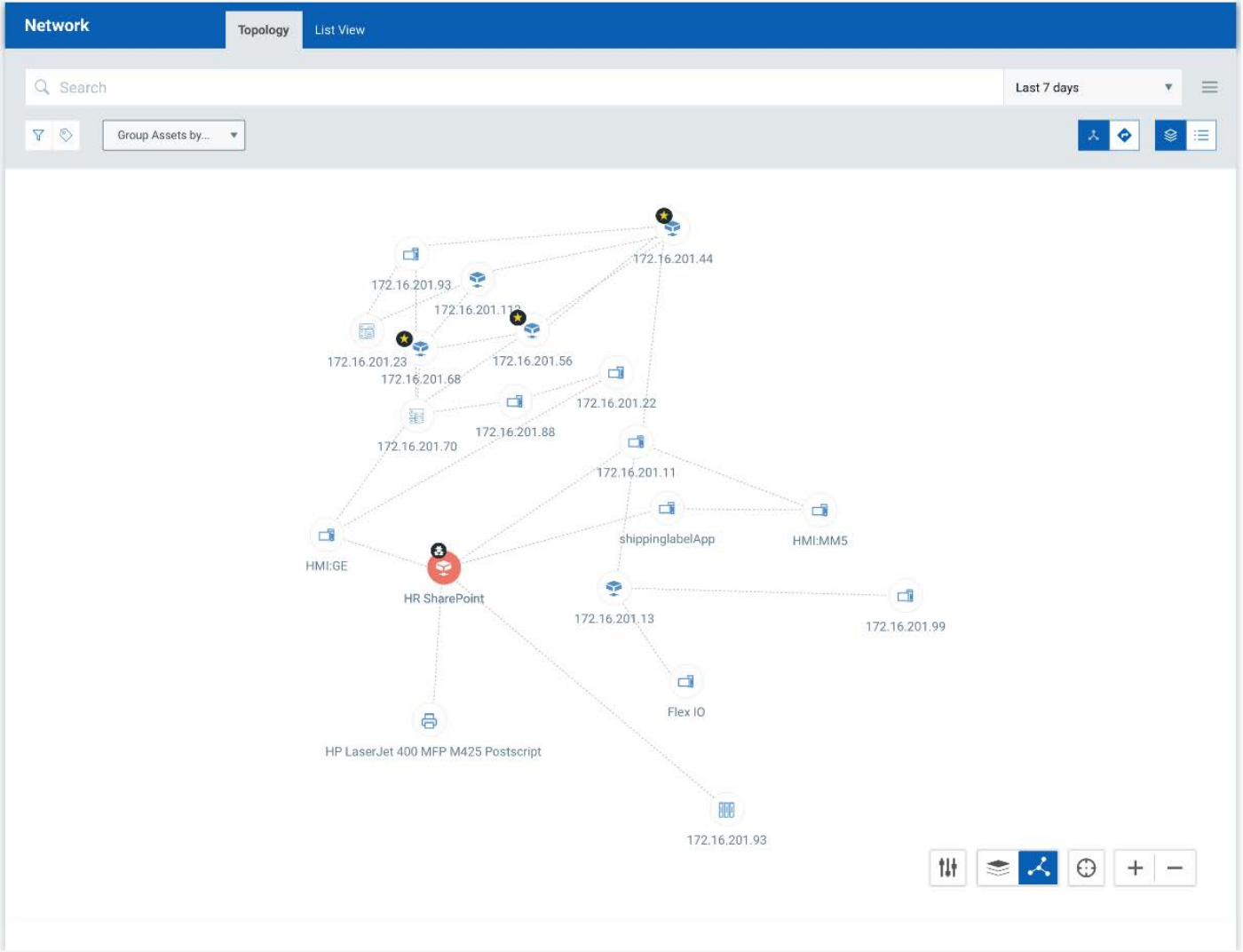
file	2
mutex	1
network	1
process	1

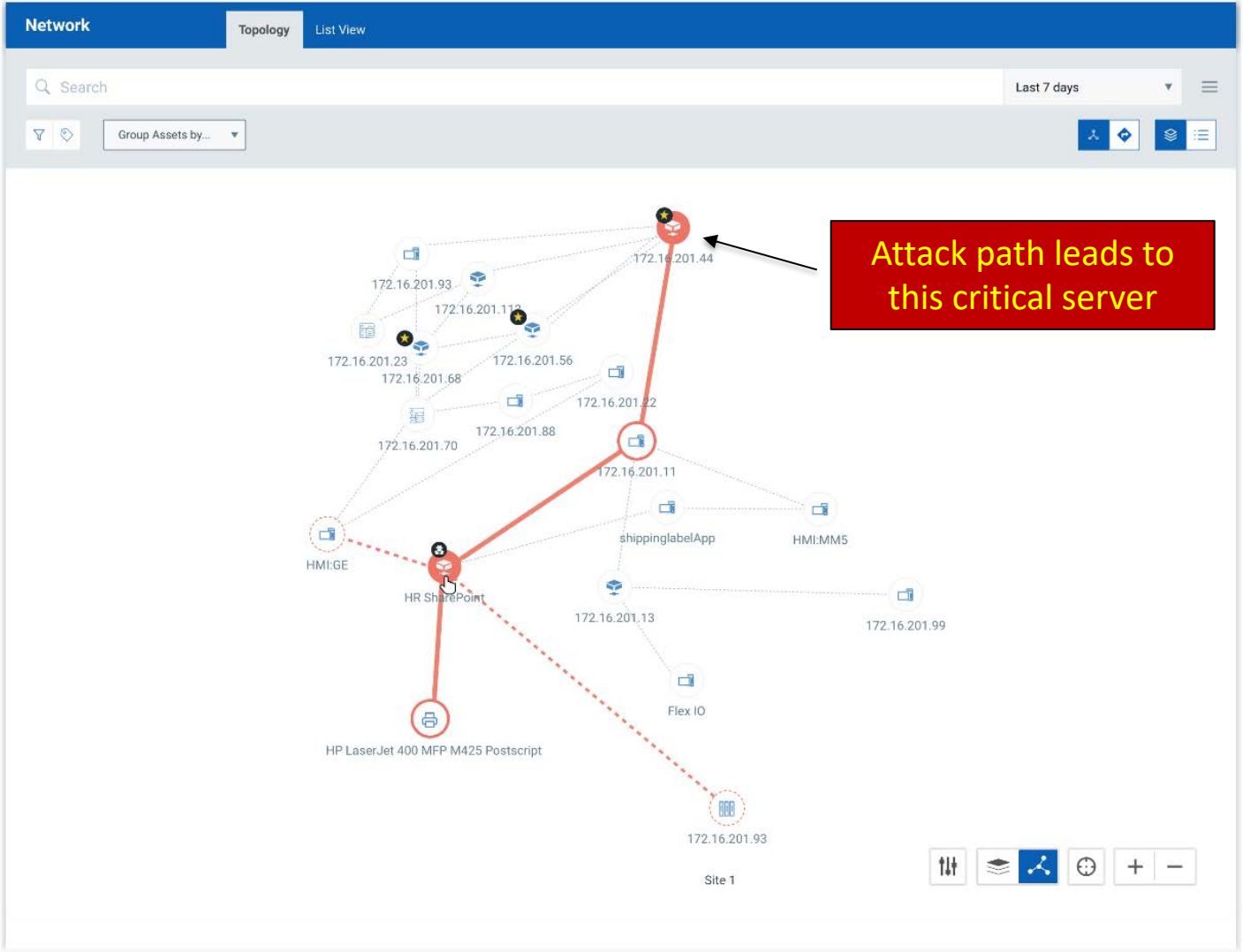
EVENT ACTION

created	2
established	1
running	2

SCORE

10	1
9	2
8	2


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
172.16.201.56
172.16.201.68
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


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
172.16.201.112
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
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HMI:MM5
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HR SharePoint
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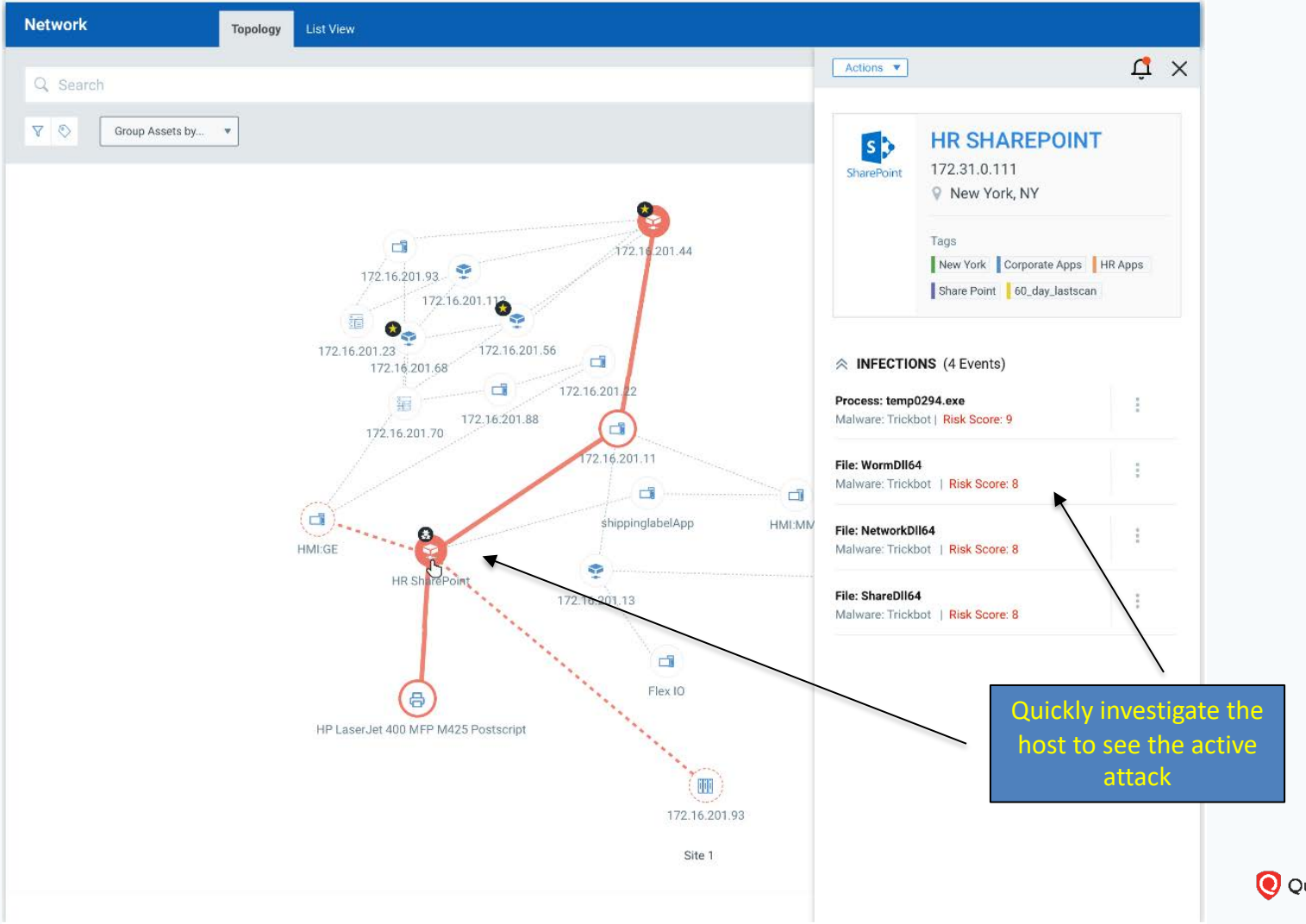
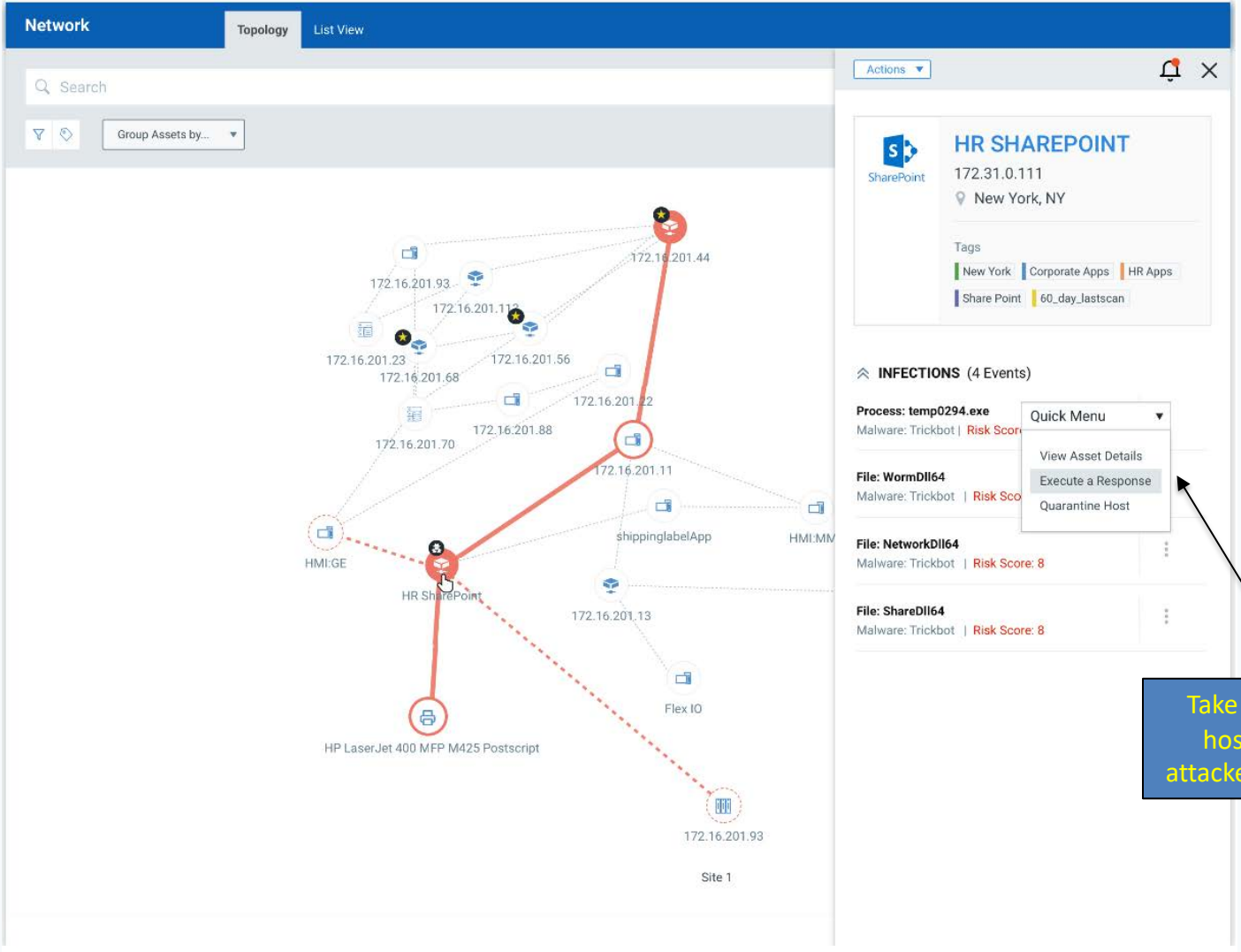
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93
Site 1

Qualys.


Network
Topology
List View
Search
Group Assets by...
Actions
HR SHAREPOINT
172.31.0.111
New York, NY
SharePoint
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
172.16.201.44
172.16.201.93
172.16.201.112
172.16.201.23
172.16.201.56
172.16.201.68
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
Quickly investigate the host to see the active attack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172.16.201.11
shippinglabelApp
HMI:MM
HMI:GE
HR SharePoint
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Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93
Site 1
Actions
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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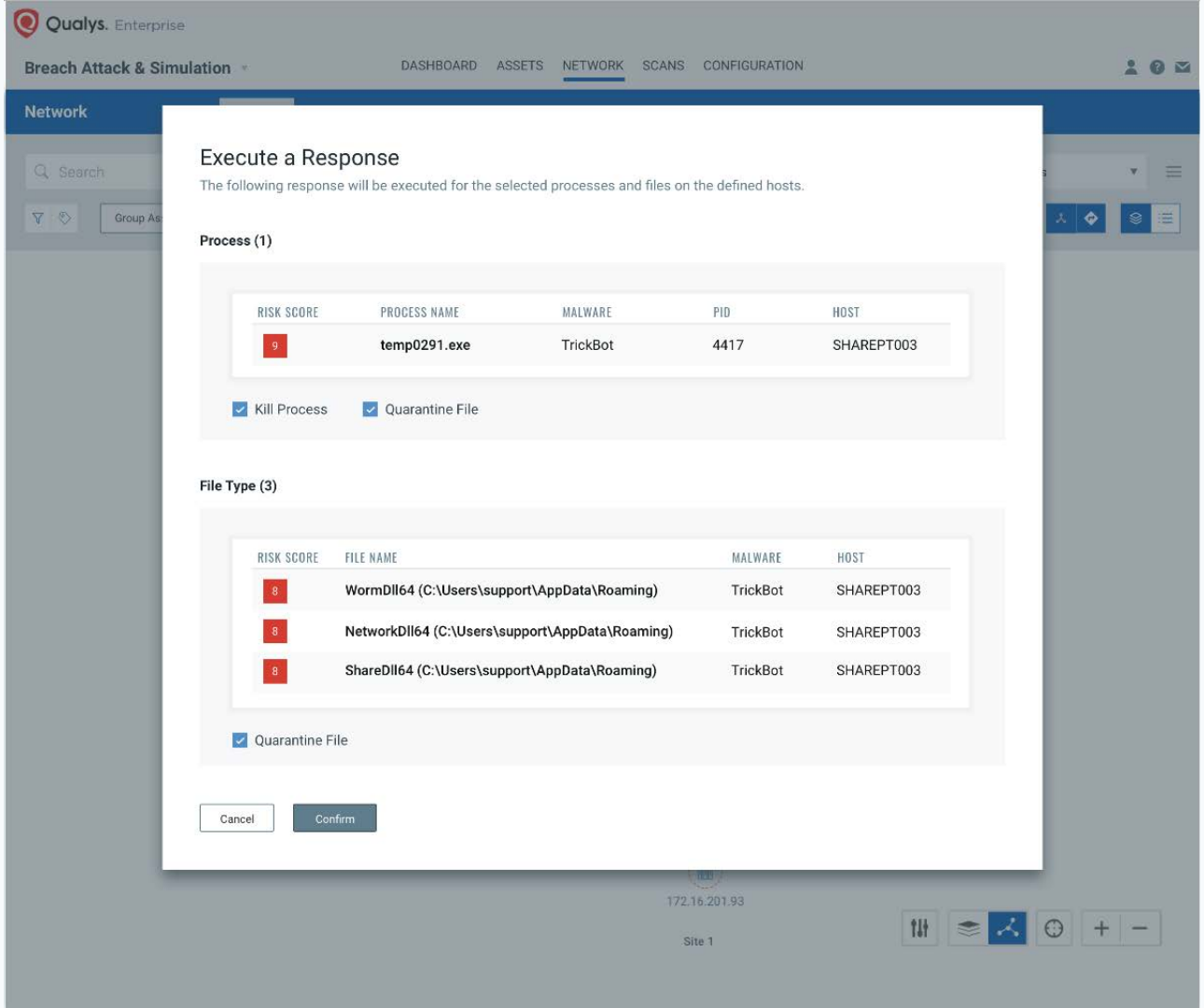

Qualys. Enterprise
Breach Attack & Simulation
DASHBOARD
ASSETS
NETWORK
SCANS
CONFIGURATION
Network
Search
Group As
Execute a Response
The following response will be executed for the selected processes and files on the defined hosts.
Process (1)
RISK SCORE
PROCESS NAME
MALWARE
PID
HOST
9
temp0291.exe
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

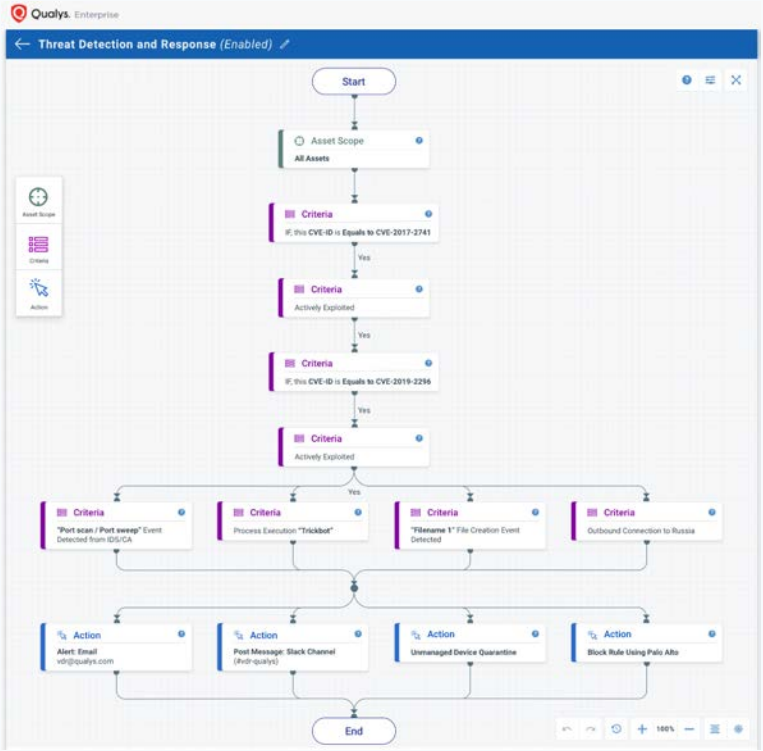
Scale Human Response with Automation

Qualys finds active attacks on endpoint using Indication of Compromise

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

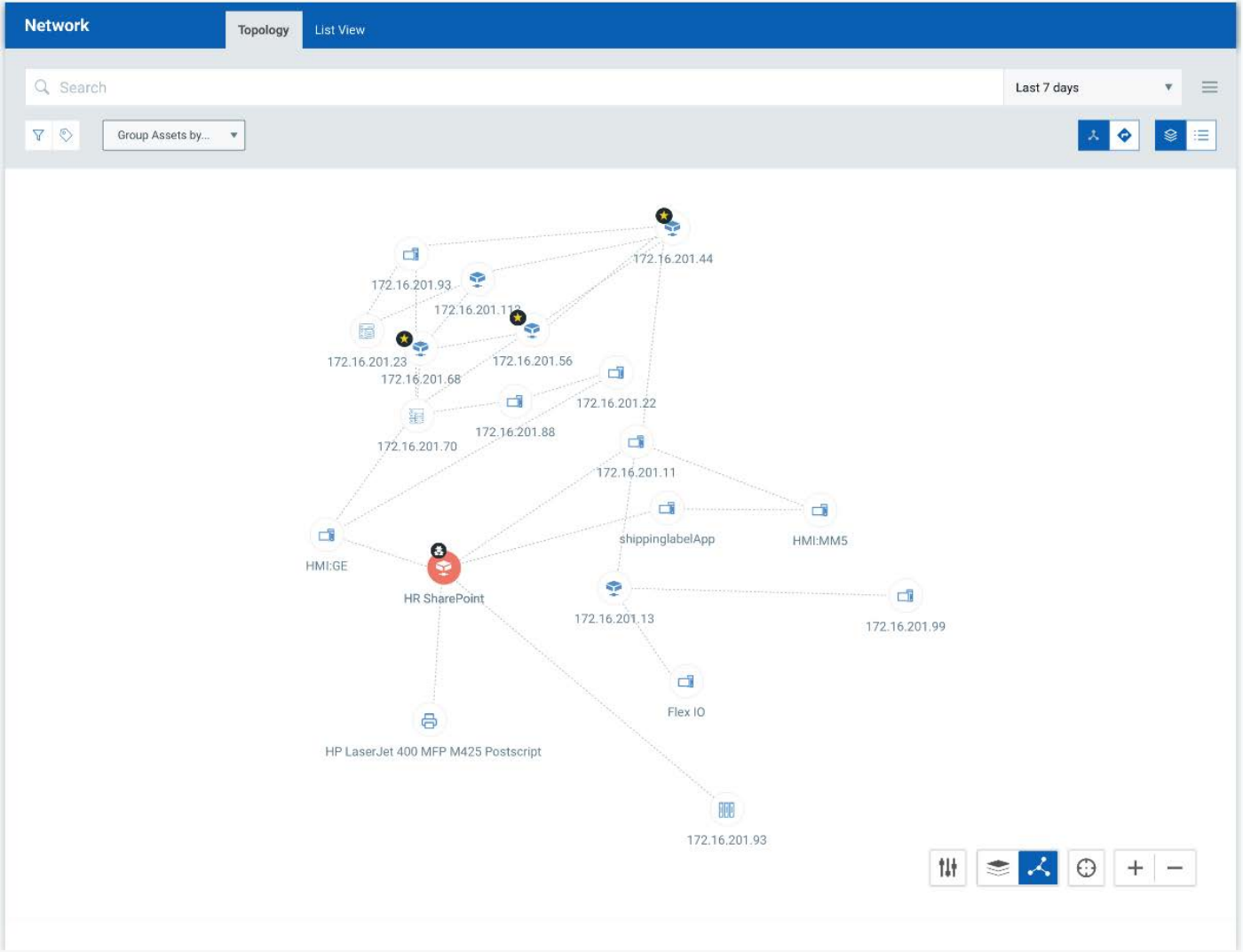
Use attack path discovery as metadata to detect attacks that can reach critical assets

Automate response to protect critical assets using Security Orchestration response playbooks



Qualys.

Attack Path Discovery
to
Prioritize Patching
and
Improve Security Defenses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shippinglabelApp
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HR SharePoint
172.16.201.13
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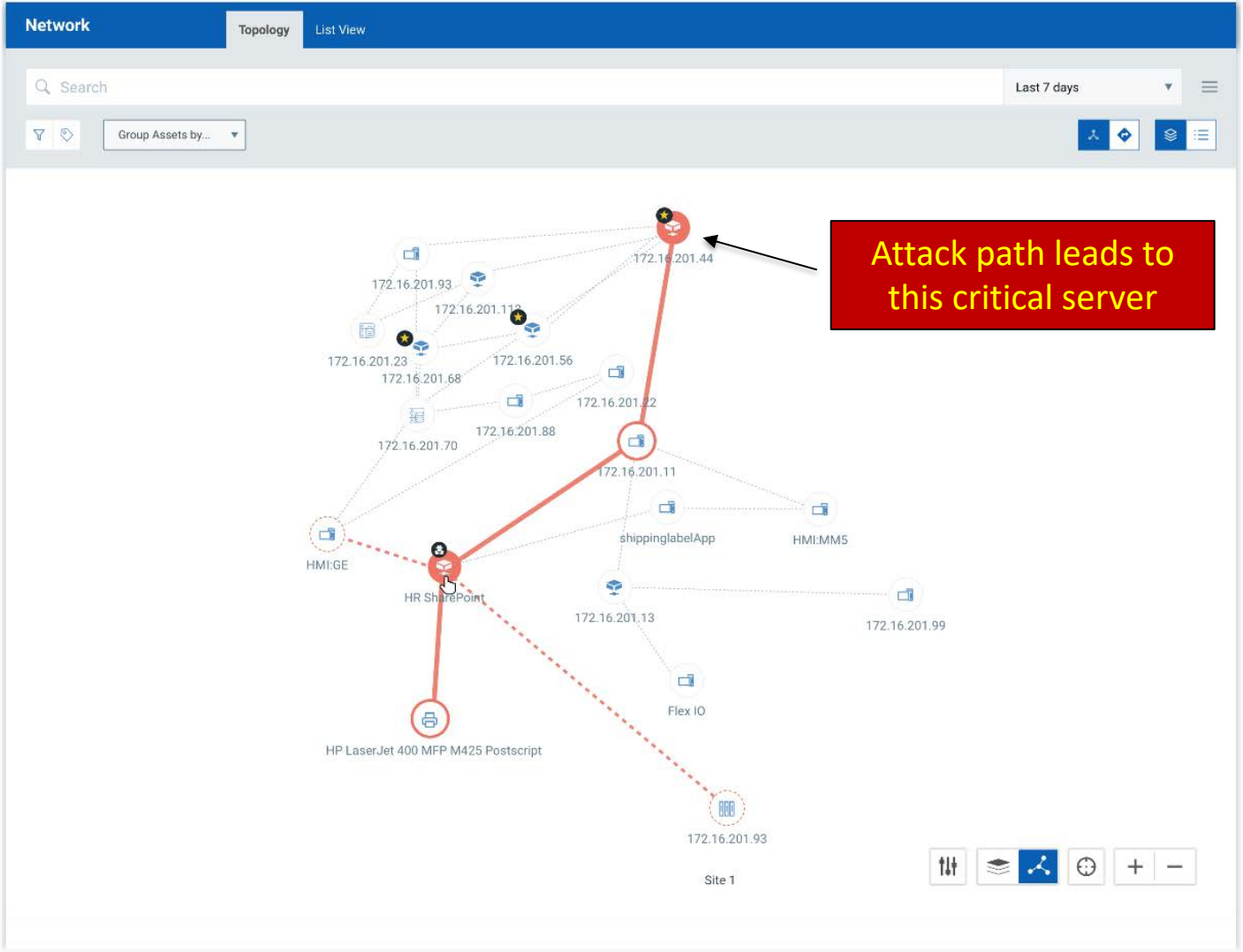
Flex IO
HP LaserJet 400 MFP M425 Postscript
172.16.201.93


Network
Topology
List View
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Group Assets by...
Attack path leads to this critical server
172.16.201.44
172.16.201.93
172.16.201.112
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172.16.201.70
172.16.201.11
shippinglabelApp
HMI:MM5
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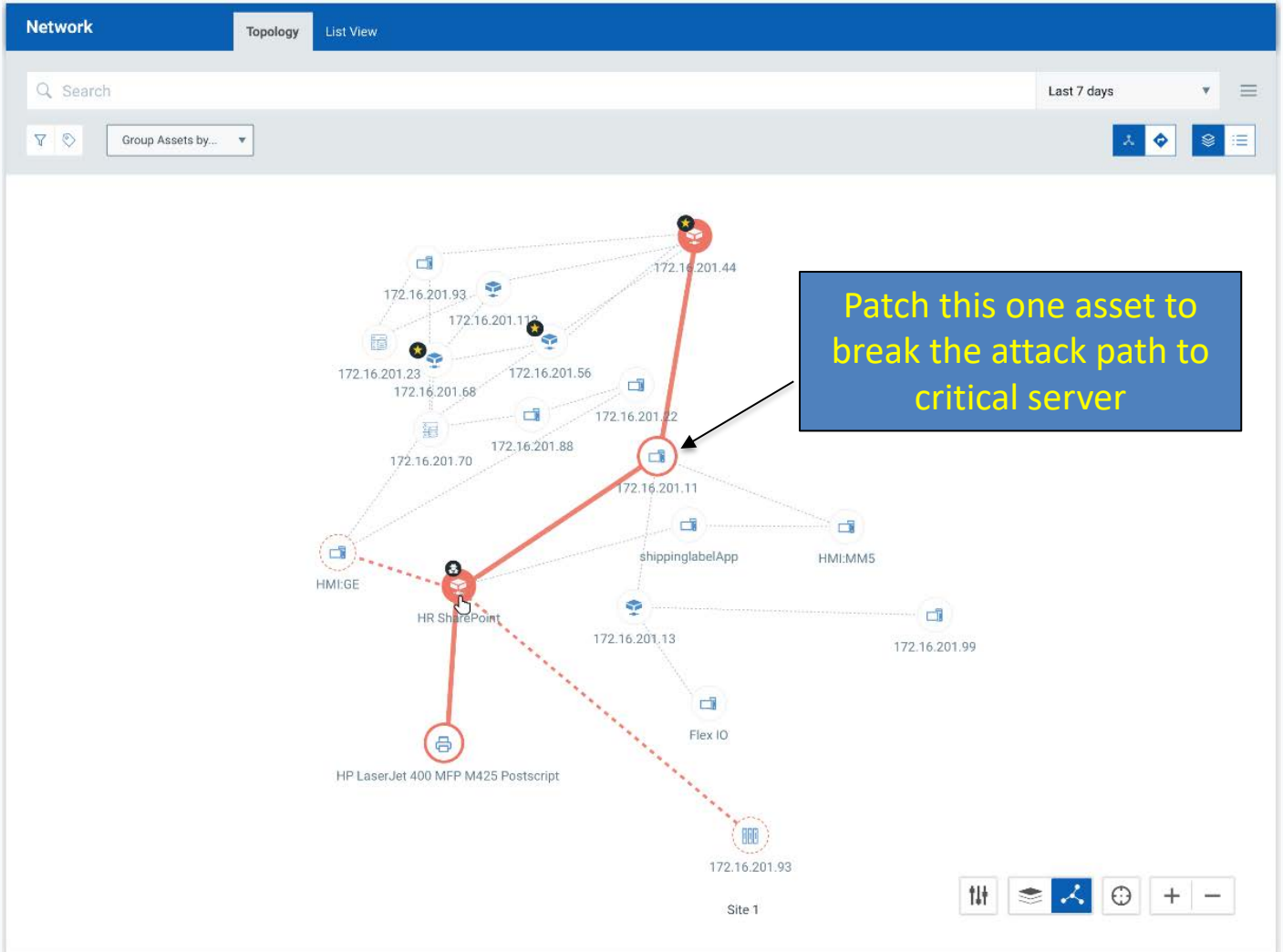
Site 1

Qualys.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172.16.201.112
172.16.201.23
172.16.201.56
172.16.201.68
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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Vulnerability Remediation Prioritization

CVSSv2 / CVSSv3 scores

Qualys QID Severity score

Qualys Tagging for Asset Business Criticality

Qualys Threat Protection Real-Time Indicators
(based on threat intel and live attacks)

Qualys VMDR Threat Prioritization
(Machine Learning model + Contextual Awareness)

Qualys Attack Path Discovery

Thank You

Chris Carlson
ccarlson@qualys.com