AWS Immersion Day LAB 4

SECURITY: THREAT PREVENTION & GEOBLOCKING

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Lab 4 Intro

Distributed Cloud Firewall Threat Prevention & Geo Blocking

Internet
LEGITAMITE TRAFFIC
Customers, Partners, Press
THREATS
TOR Nodes
Known Bad Actors
UNKNOWN GEOS
Questionable Countries
Adversaries
10.51.0.0/16
Spoke 1
Jump Instance
10.51.0.10
SAP1
10.52.0.0/16
Spoke 2
10.52.0.10
SAP2
10.52.0.0/16
Spoke 3
10.53.0.10
SAP3
Transit
10.50.0.0/16
AWS us-west-2
Controller VPC
Aviatrix CoPilot
Aviatrix Controller
AWS us-east-1

In this Lab we will allow our Production SAP 1, SAP 2 and SAP3 instances open access to the internet for legitimate customer connections, while providing automated security for reputation-based threats and unknown geographies.

Lab 4: Current State

Internet
AWS ONLY
*.amazonaws.com
THREATS
TOR Nodes
Known Bad Actors
UNKNOWN GEOS
Questionable Countries
Adversaries
Controller VPC
Aviatrix CoPilot
Aviatrix Controller
AWS us-east-1
10.51.0.0/16
Spoke 1
Jump Instance
10.52.0.0/16
Spoke 2
10.52.0.0/16
Spoke 3
PROD
10.51.0.10
SAP1
10.52.0.10
SAP2
10.53.0.10
SAP3
Transit
10.50.0.0/16
AWS us-west-2

__Remember:__ In Lab 2 we created a secure egress policy for PROD and DEV that only allowed traffic to ***.amazonaws.com domains**

__Next:__ Let's create a firewall rule that allows EC2 instances in the PROD SmartGroup to access the open internet.

__Remember:__ The PROD SmartGroup you created in Lab 2 automatically contains any EC2 instances tagged with **Environment = Production**

Lab 4: Threat Prevention: Step 4.1

Allow open internet for PROD

Create a new Firewall rule. 1

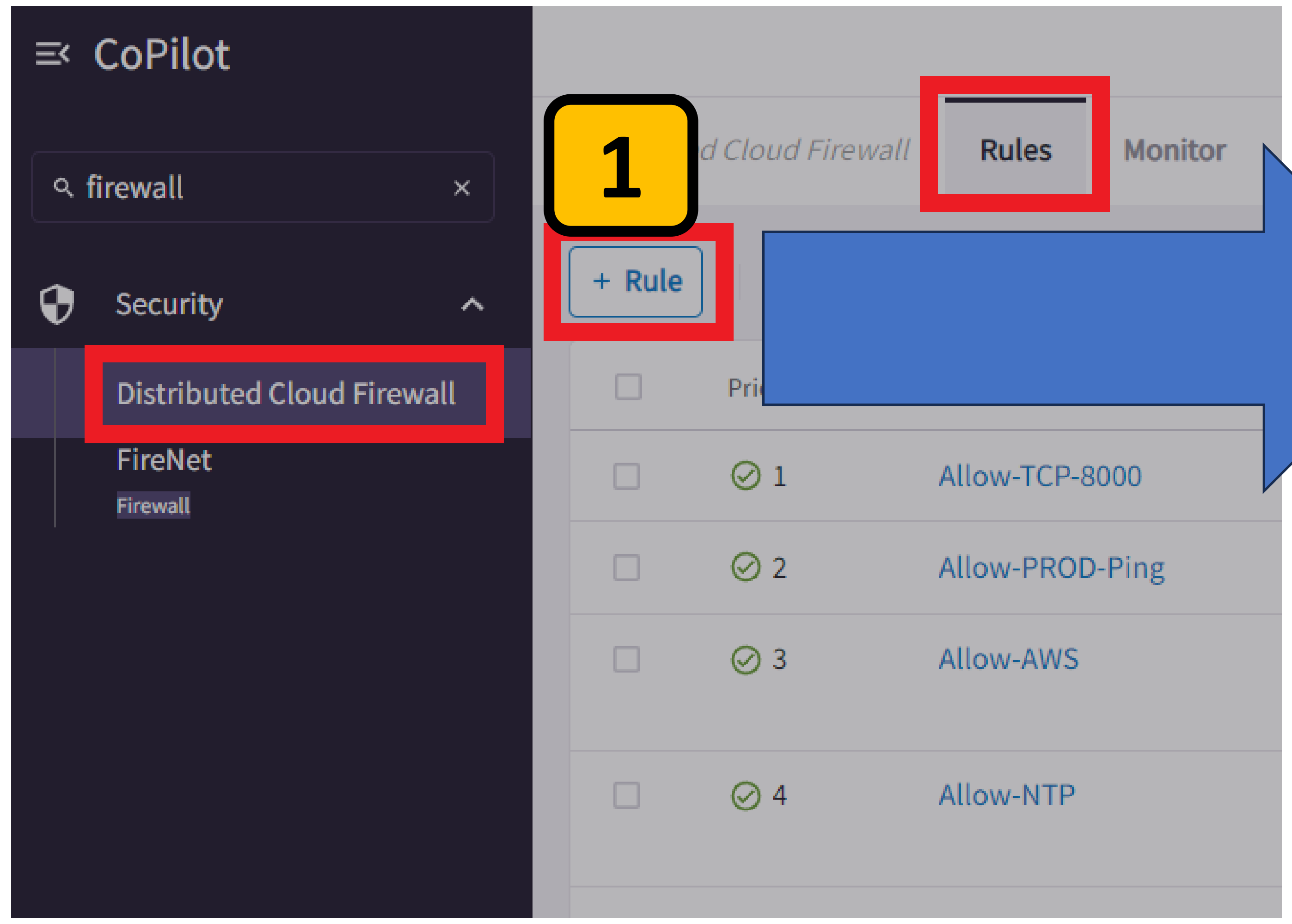
Name the rule PROD-Internet and allow PROD to access the Public Internet. 2

~~Allow this traffic to access any domain using the default **Any-Web** WebGroup.~~ 3 **Leave WebGroups Blank***

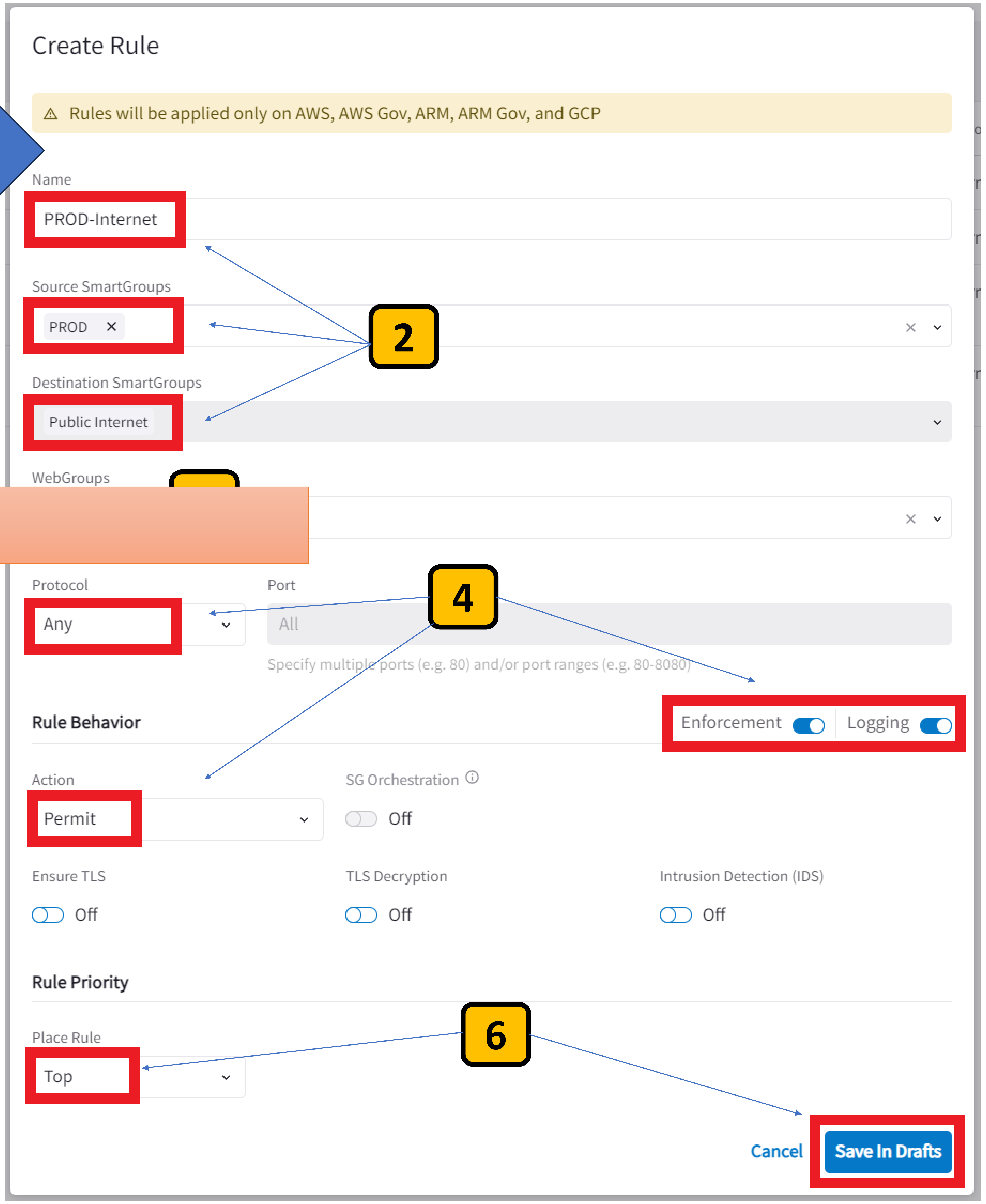
Set Protocol to **Any** and enable Logging and Permit the traffic. 4

Place the rule on **Top** and click **Save In Drafts** 6

*** There is currently a bug with L7 rules not generating Netflow records, that will be fixed in the next release.**



1	Allow-TCP-8000
2	Allow-PROD-Ping
3	Allow-AWS
4	Allow-NTP



Create Rule

⚠ Rules will be applied only on AWS, AWS Gov, ARM, ARM Gov, and GCP

Name: PROD-Internet

Source SmartGroups: PROD ×

Destination SmartGroups: Public Internet

WebGroups:

Protocol: Any

Port: All

Specify multiple ports (e.g. 80) and/or port ranges (e.g. 80-8080)

Rule Behavior

Enforcement: On

Logging: On

Action: Permit

SG Orchestration: Off

Ensure TLS: Off

TLS Decryption: Off

Intrusion Detection (IDS): Off

Rule Priority

Place Rule: Top

Lab 4: Threat Prevention: Step 4.1

Allow open internet for PROD

CoPilot
firewall
Security
Distributed Cloud Firewall
FireNet
Firewall
Distributed Cloud Firewall
Rules
Monitor
Detected Intrusions
WebGroups
Settings
+ Rule
Actions
1 New
Discard
Commit
Search
1

□	Priority	Name	Source	Destination	WebGroup
□	✓ 0	PROD-Internet	PROD	Public Internet	🟧
□	✓ 1	Allow-TCP-8000	PROD	PROD	
□	✓ 2	Allow-PROD-Ping	PROD	PROD	
□	✓ 3	Allow-AWS	DEV, PROD	Public Internet	Allow-AWS
□	✓ 4	Allow-NTP	DEV, PROD	Public Internet	

Commit the new firewall rule 1

Lab 4: Threat Prevention: Step 4.2

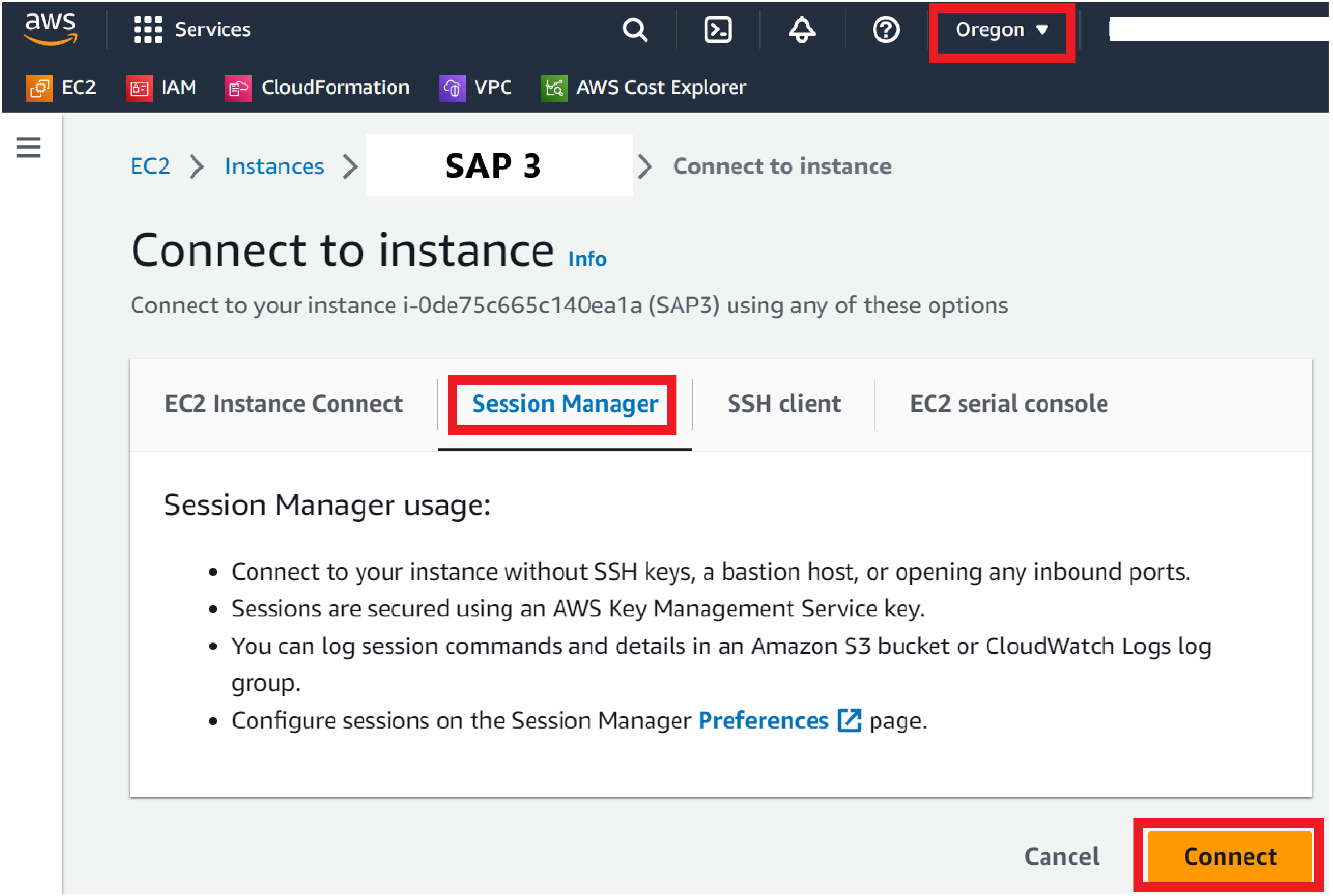
Connect to Console of instance SAP 3 to test your new PROD-Internet rule

Now let’s test the new firewall rule.

Connect to the console of instance SAP 3 using Session Manager as you’ve done in previous labs.

Make sure you’re in the Oregon region. Select the SAP 3 instance and click Connect.

Select Session Manager and click **Connect**.



Connect to instance Info

Connect to your instance i-0de75c665c140ea1a (SAP3) using any of these options

Session Manager usage:

- Connect to your instance without SSH keys, a bastion host, or opening any inbound ports.
- Sessions are secured using an AWS Key Management Service key.
- You can log session commands and details in an Amazon S3 bucket or CloudWatch Logs log group.
- Configure sessions on the Session Manager Preferences page.

Lab 4: Threat Prevention: Step 4.3

Confirm open internet access for PROD

Login as ec2-user by issuing the command:

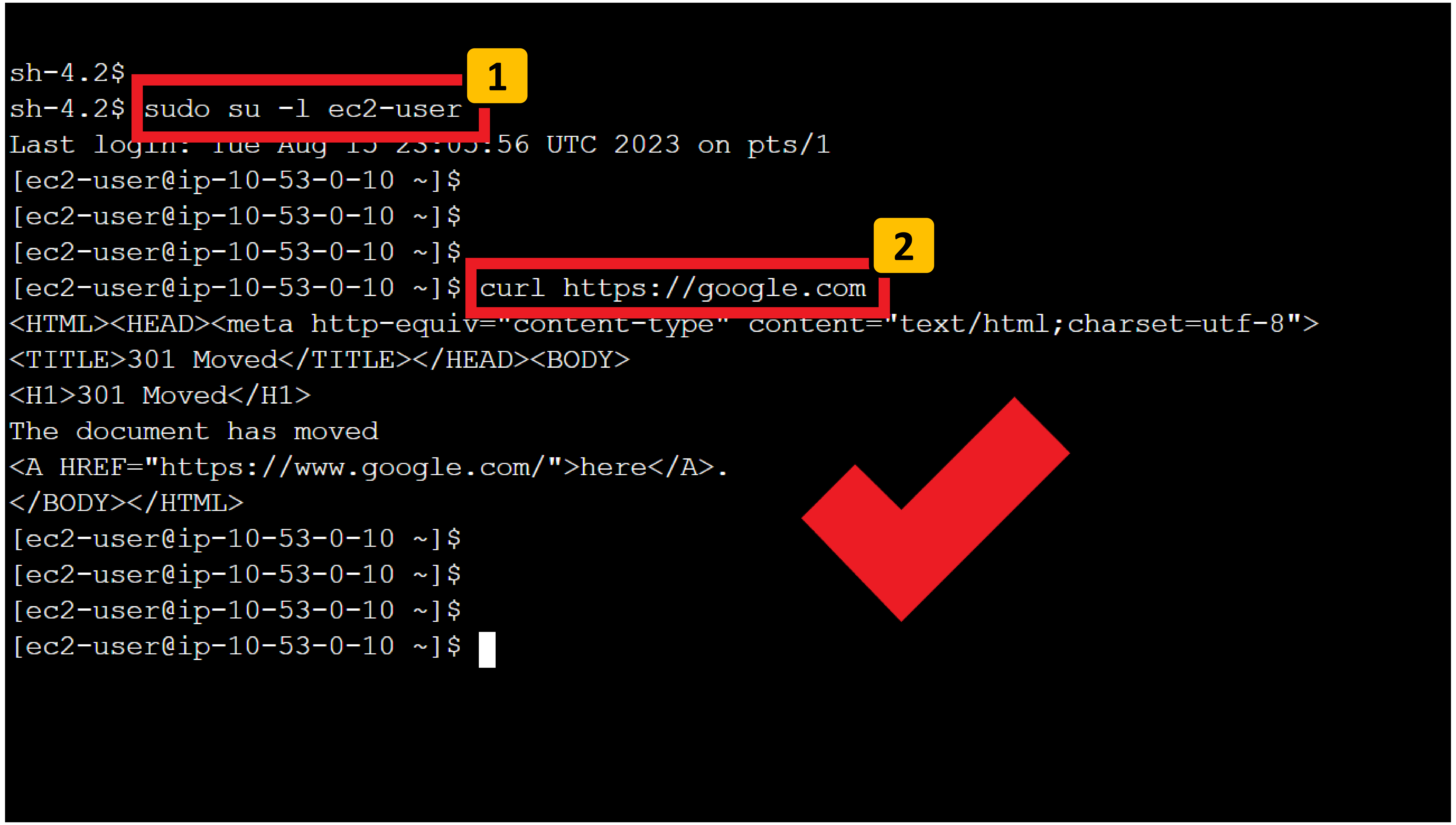
sudo su –l ec2-user 1

Connect to any website using the curl command (e.g., google.com)

curl https://google.com 2

The curl should return HTML code from the site you connected to.

Session ID: brad-0a81a0d1bec850995   Instance ID: i-0de75c665c140ea1a



```
sh-4.2$
sh-4.2$ sudo su -l ec2-user
Last login: Tue Aug 15 23:05:56 UTC 2023 on pts/1
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$ curl https://google.com
<HTML><HEAD><meta http-equiv="content-type" content="text/html;charset=utf-8">
<TITLE>301 Moved</TITLE></HEAD><BODY>
<H1>301 Moved</H1>
The document has moved
<A HREF="https://www.google.com/">here</A>.
</BODY></HTML>
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
```

Lab 4: Checkpoint 1: Current State

10.51.0.0/16
Spoke 1
Jump Instance
10.51.0.10
SAP1
10.52.0.0/16
Spoke 2
PROD
10.52.0.10
SAP2
10.52.0.0/16
Spoke 3
10.53.0.10
SAP3
Transit
10.50.0.0/16
AWS us-west-2
Internet
LEGITIMATE TRAFFIC
Customers, Partners, etc.
THREATS
TOR Nodes
Known Bad Actors
UNKNOWN GEOS
Questionable Countries
Adversaries
Controller VPC
Aviatrix CoPilot
Aviatrix Controller
AWS us-east-1

At this point you've allowed the PROD group of instances to the open internet to connect to any customer, partner, or other legitimate traffic.

However: The PROD instances can also connect to threats anywhere on the internet such as known bad actors, TOR Nodes, or connecting to GEOs they have no business connecting to.

Lab 4: Checkpoint 1: Current State

10.51.0.0/16
Spoke 1
Jump Instance
10.51.0.10
SAP1
10.52.0.0/16
Spoke 2
PROD
10.52.0.10
SAP2
10.52.0.0/16
Spoke 3
10.53.0.10
SAP3
Transit
10.50.0.0/16
AWS us-west-2
Internet
LEGITIMATE TRAFFIC
Customers, Partners, etc.
THREATS
TOR Nodes
Known Bad Actors
UNKNOWN GEOS
Questionable Countries
Adversaries
Controller VPC
Aviatrix CoPilot
Aviatrix Controller
AWS us-east-1

Next: Let's confirm that our PROD instances can connect to threats (TOR Node).

Then: You will enable ThreatIQ and confirm that connections to threats will be detected and automatically blocked by the Aviatrix Gateways.

Lab 4: Threat Prevention: Step 4.4

Investigate an abuse IP

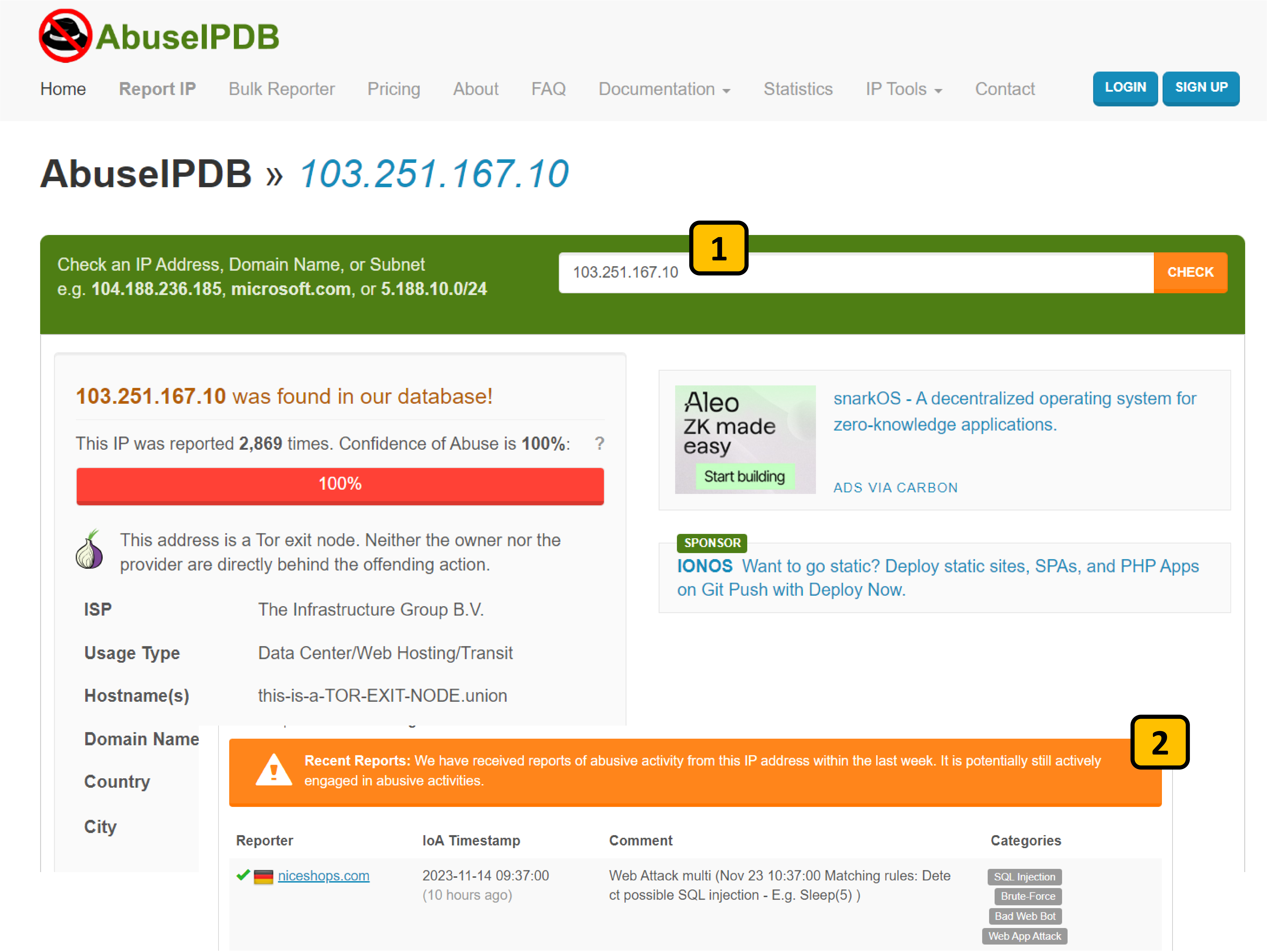
Open a browser tab to the website: **http://abuseipdb.com**

Check the following IP address: **103.251.167.10** 1

Confirm this IP has been found in the database, scroll down and read the recent reports about it. 2

This IP is a TOR Node and it's been reported doing questionable activity as you can see.

This is not an IP you want connecting to your PROD instances!



AbuseIPDB » 103.251.167.10

Check an IP Address, Domain Name, or Subnet
e.g. **104.188.236.185**, **microsoft.com**, or **5.188.10.0/24**

103.251.167.10 — CHECK

1

103.251.167.10 was found in our database!

This IP was reported **2,869** times. Confidence of Abuse is **100%**: ?

100%

This address is a Tor exit node. Neither the owner nor the provider are directly behind the offending action.

ISP	The Infrastructure Group B.V.
Usage Type	Data Center/Web Hosting/Transit
Hostname(s)	this-is-a-TOR-EXIT-NODE.union
Domain Name	
Country	
City	

2

Recent Reports: We have received reports of abusive activity from this IP address within the last week. It is potentially still actively engaged in abusive activities.

Reporter	IoA Timestamp	Comment	Categories
✓ niceshops.com	2023-11-14 09:37:00 (10 hours ago)	Web Attack multi (Nov 23 10:37:00 Matching rules: Detect possible SQL injection - E.g. Sleep(5))	SQL Injection Brute-Force Bad Web Bot Web App Attack

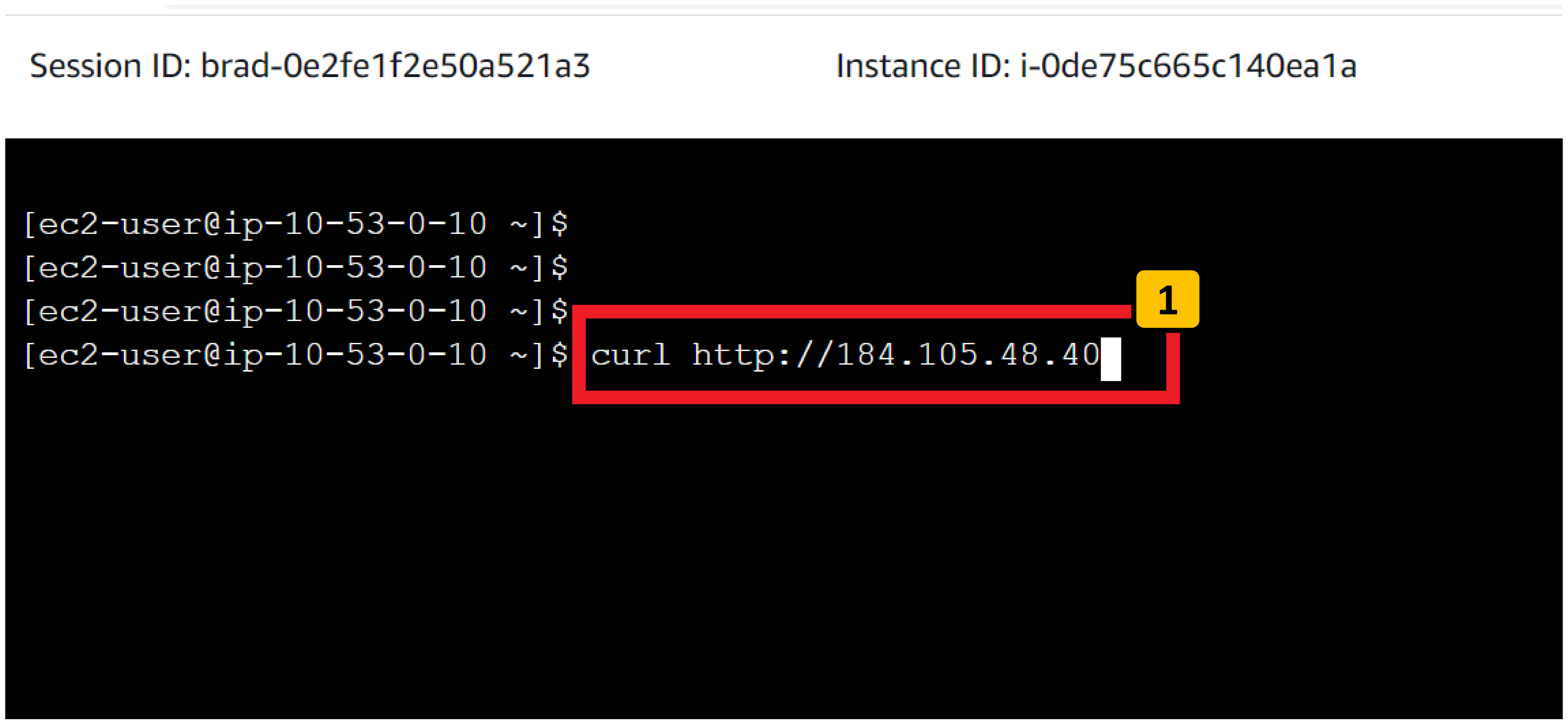
Lab 4: Threat Prevention: Step 4.5

Connect to the abuse IP

From your Console session on instance SAP 3, connect to the abuse IP using curl:

curl http://184.105.48.40 1

Note: (HTTP …. Not HTTPS)



Session ID: brad-0e2fe1f2e50a521a3 Instance ID: i-0de75c665c140ea1a

```
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$ curl http://184.105.48.40
```

Lab 4: Threat Prevention: Step 4.6

Connect to the abuse IP

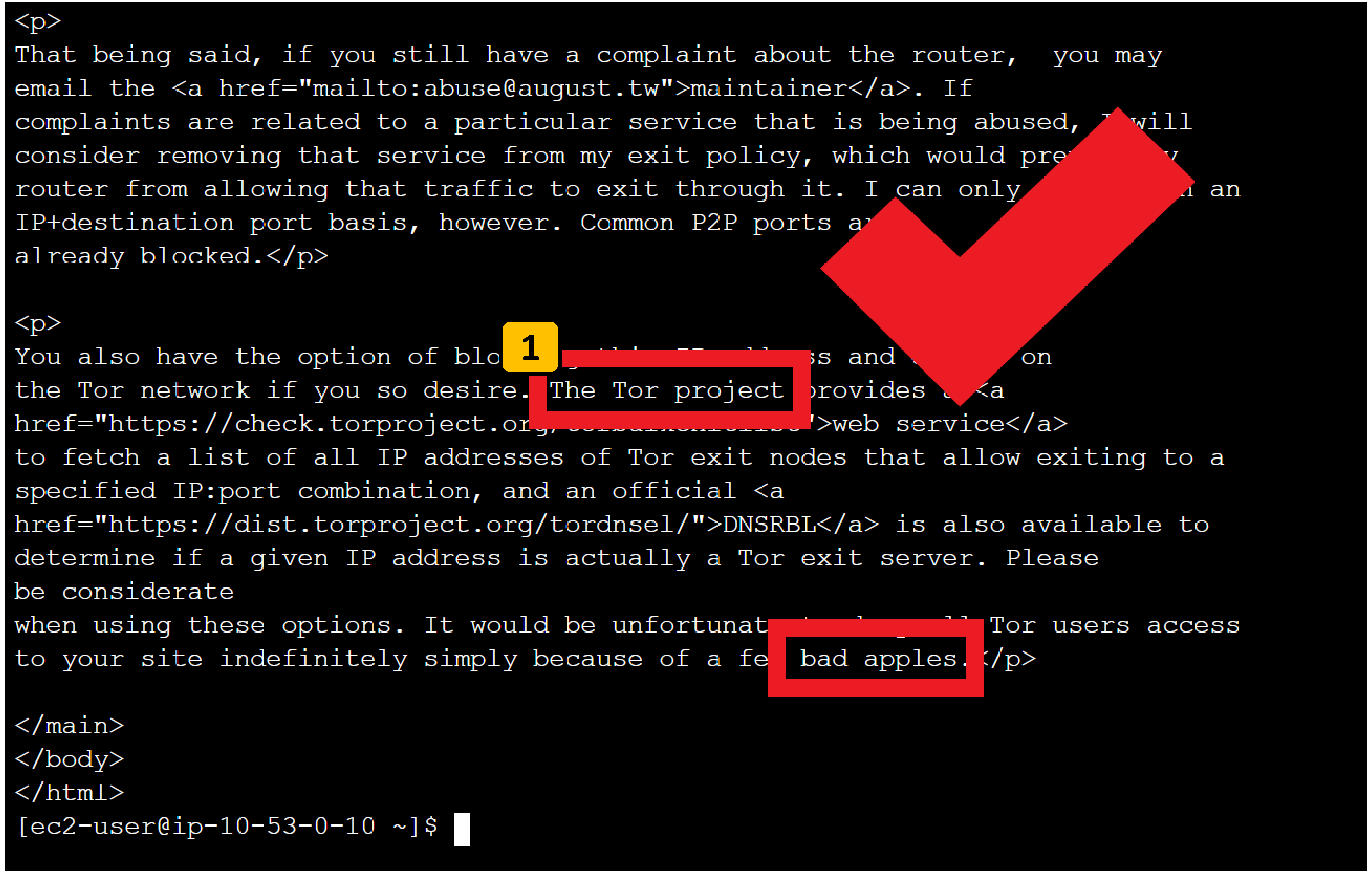
The instance should successfully connect to the abuse IP.

It returns HTML code telling us that it's a TOR Node. 1

This is obviously not good.

How can we easily and quickly shut this down while still providing open internet access?

Let's see what Aviatrix can do about it…



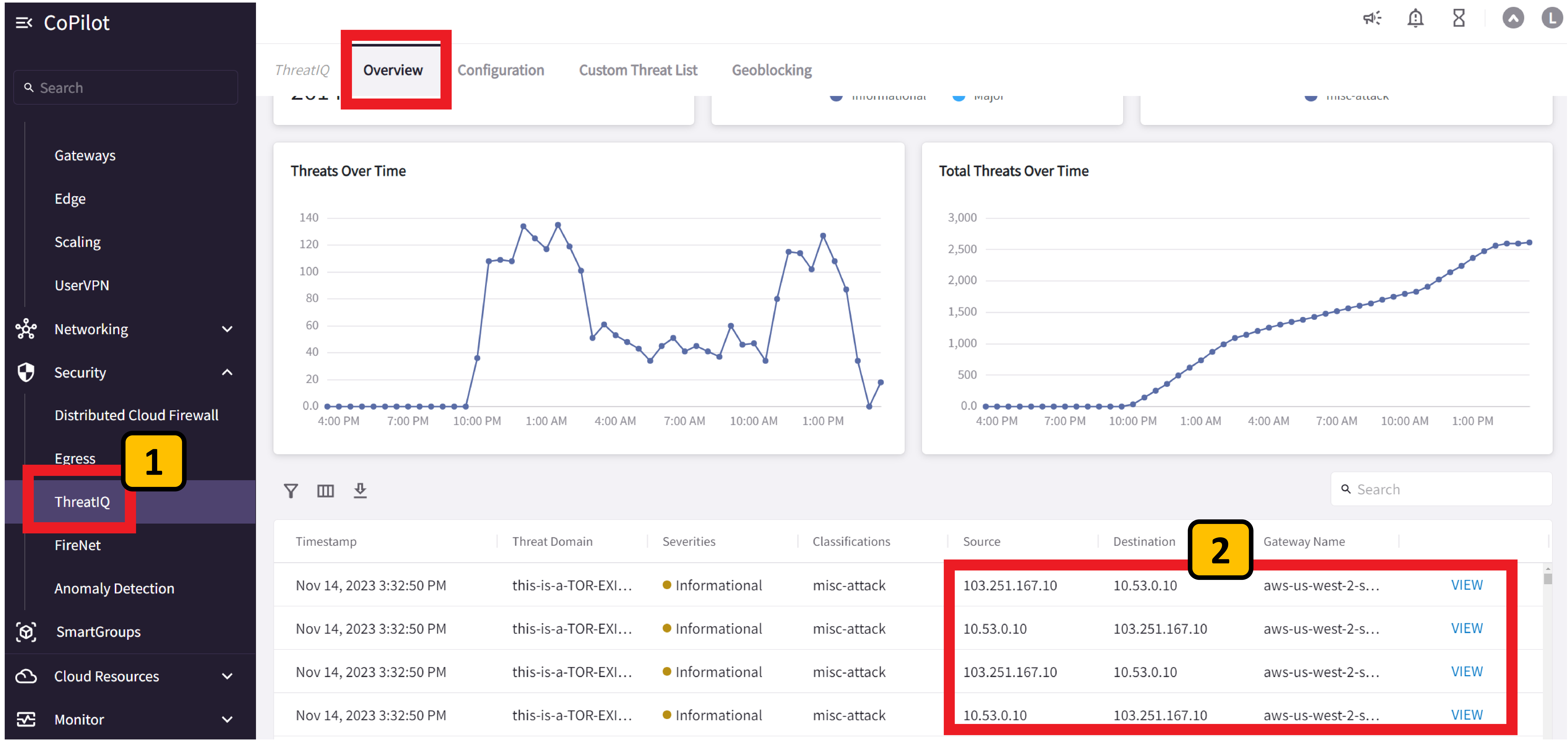
```
<p>
That being said, if you still have a complaint about the router,  you may
email the <a href="mailto:abuse@august.tw">maintainer</a>. If
complaints are related to a particular service that is being abused, I will
consider removing that service from my exit policy, which would prevent my
router from allowing that traffic to exit through it. I can only filter on an
IP+destination port basis, however. Common P2P ports are
already blocked.</p>

<p>
You also have the option of blocking this IP address and others on
the Tor network if you so desire. The Tor project provides a <a
href="https://check.torproject.org/cgi-bin/TorBulkExitList.py">web service</a>
to fetch a list of all IP addresses of Tor exit nodes that allow exiting to a
specified IP:port combination, and an official <a
href="https://dist.torproject.org/tordnsel/">DNSRBL</a> is also available to
determine if a given IP address is actually a Tor exit server. Please
be considerate
when using these options. It would be unfortunate to deny all Tor users access
to your site indefinitely simply because of a few bad apples.</p>

</main>
</body>
</html>
[ec2-user@ip-10-53-0-10 ~]$
```

Lab 4: Threat Prevention: Step 4.7

Observe the threat in ThreatIQ



Timestamp	Threat Domain	Severities	Classifications	Source	Destination	Gateway Name	
Nov 14, 2023 3:32:50 PM	this-is-a-TOR-EXI…	● Informational	misc-attack	103.251.167.10	10.53.0.10	aws-us-west-2-s…	VIEW
Nov 14, 2023 3:32:50 PM	this-is-a-TOR-EXI…	● Informational	misc-attack	10.53.0.10	103.251.167.10	aws-us-west-2-s…	VIEW
Nov 14, 2023 3:32:50 PM	this-is-a-TOR-EXI…	● Informational	misc-attack	103.251.167.10	10.53.0.10	aws-us-west-2-s…	VIEW
Nov 14, 2023 3:32:50 PM	this-is-a-TOR-EXI…	● Informational	misc-attack	10.53.0.10	103.251.167.10	aws-us-west-2-s…	VIEW

CoPilot is always watching your traffic for threats in ThreatIQ

Go to **ThreatIQ** under Security 1

Look for the threat connection from your curl in ThreatIQ 2

Note: It may take a few minutes for ThreatIQ to acknowledge and display the threat.

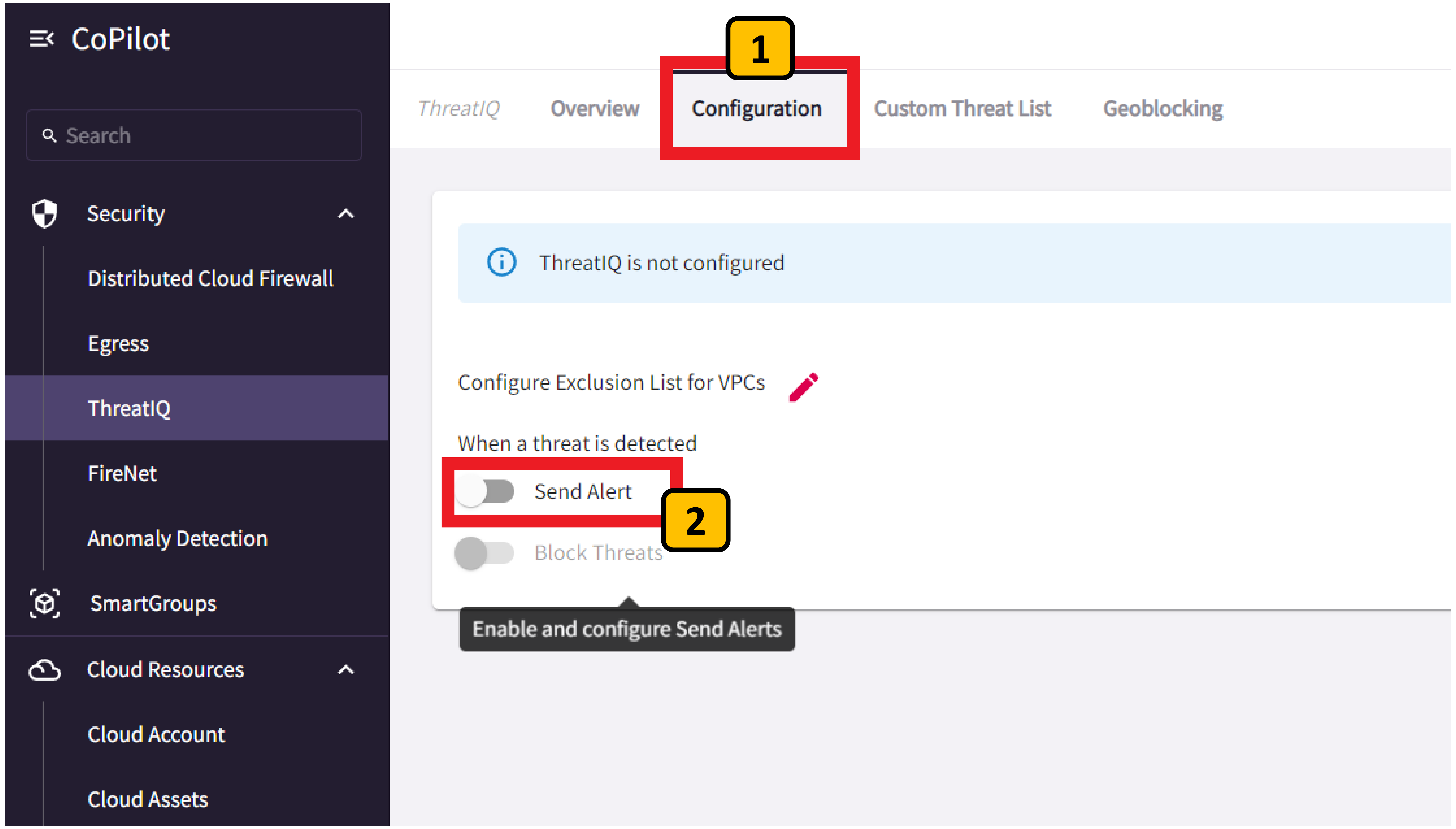
Lab 4: Threat Prevention: Step 4.8

Enable threat alerting in ThreatIQ

To protect our PROD instances, lets begin by enable alerts when ThreatIQ sees a threat connection.

Go to the **Configuration** tab in ThreatIQ 1

Enable the **Send Alert** switch. 2



ThreatIQ is not configured

Configure Exclusion List for VPCs

When a threat is detected

Send Alert

Block Threats

Enable and configure Send Alerts

Lab 4: Threat Prevention: Step 4.9

Enable threat alerting in ThreatIQ

ThreatIQ Configuration

Define Alert

Name of the Alert: ThreatIQ Alert

Condition

Select a Metric (e.g. Rate, Status): Threat IP Detected

An Alert will be sent when a threat is detected.

Add Recipient(s)

alerts@email.com

Alert conditions are evaluated every minute.

When conditions are met, alerts will be sent to selected recipients.

To configure an alert, add recipients in Notification Settings

In the configuration pop-up click **Add Recipients** and select the email address you created earlier to receive alerts. 1

Then **Confirm.** 2

Lab 4: Threat Prevention: Step 4.10

Create a Notification Recipient for detected Threats

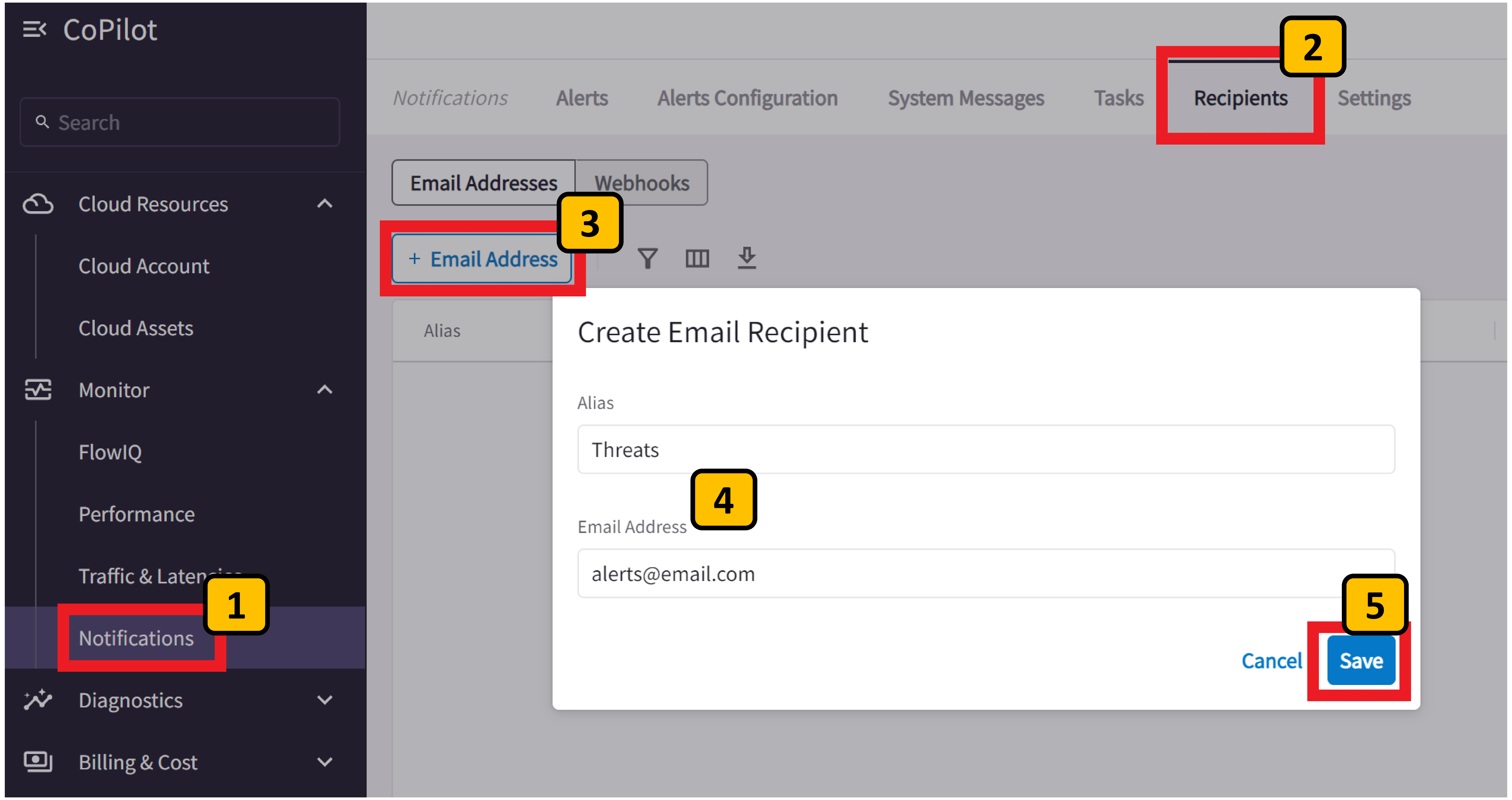
From the CoPilot UI select the **Notifications** section under Monitor. 1

Select the **Recipients** tab. 2

Click **+ Email Address** button to add an email recipient. 3

Name the Alias Threats and provide an email address. 4

Click **Save**. 5



Create Email Recipient

Alias: Threats

Email Address: alerts@email.com

Note: In a real word production deployment you can also create Webhook recipients to be ingested by anything that accepts Webhooks, like a Slack channel or your favorite SIEM system.

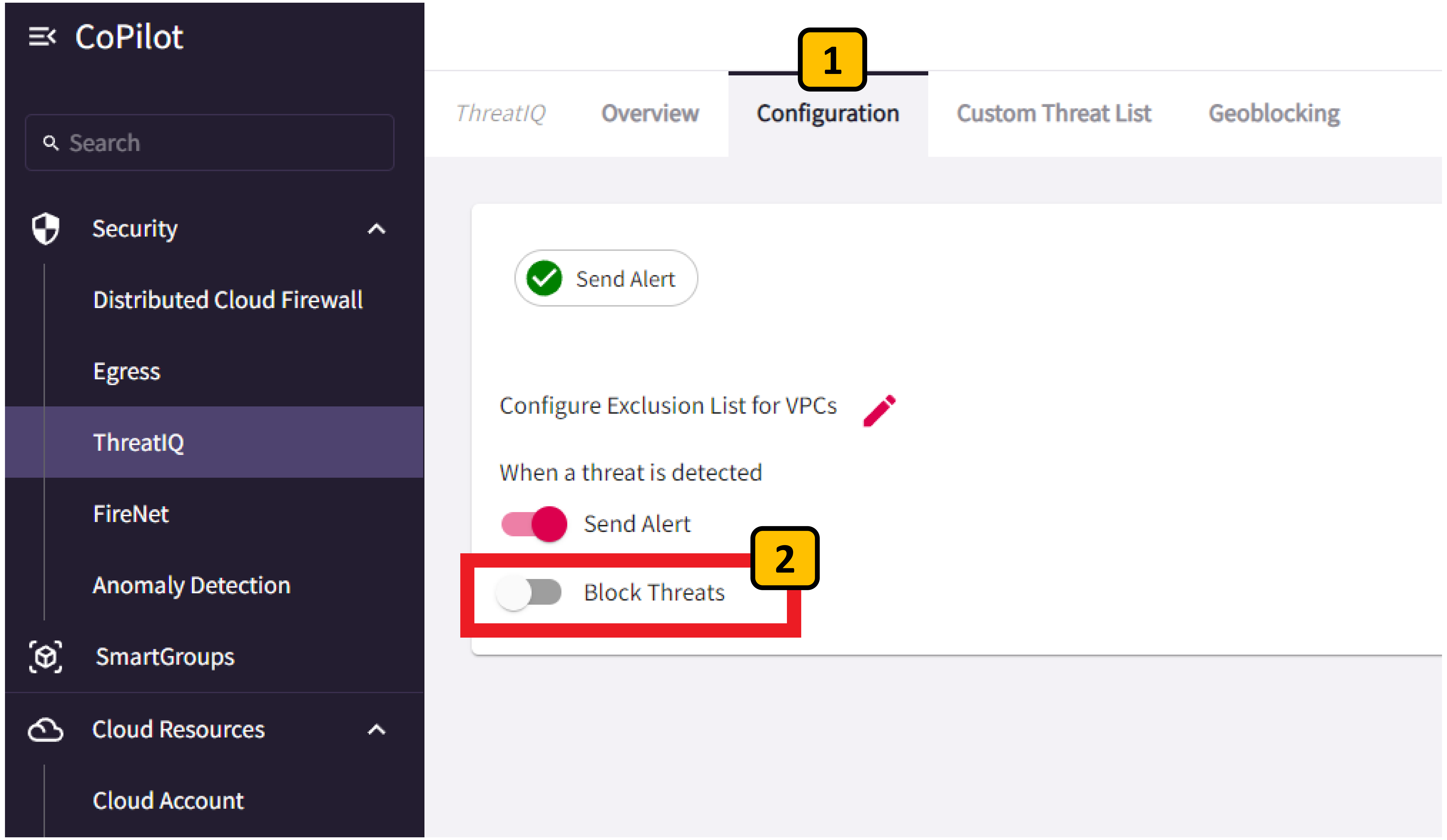
Lab 4: Threat Prevention: Step 4.11

Enable threat BLOCKING in ThreatIQ

Next, let's tell CoPilot to automatically block the threats when they're observed.

Go to the **Configuration** tab in ThreatIQ 1

Enable the **Block Threats** switch. 2



Lab 4: Threat Prevention: Step 4.11

Enable threat BLOCKING in ThreatIQ

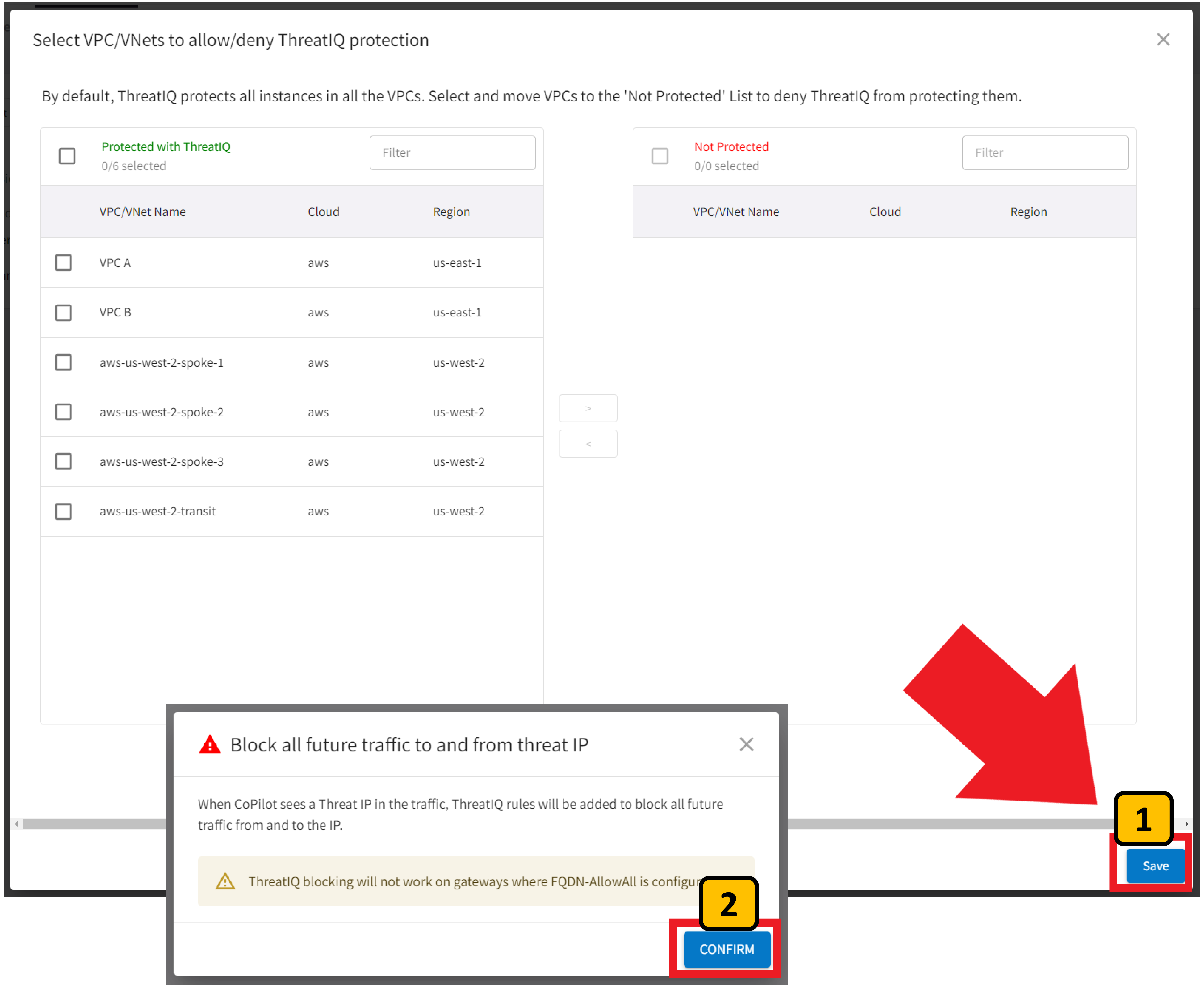
You can select which VPCs will have threat blocking enabled.

By default, all VPCs will be protected.

Let's keep it that way for now.

Click **Save**. 1

Then **Confirm**. 2



Select VPC/VNets to allow/deny ThreatIQ protection

By default, ThreatIQ protects all instances in all the VPCs. Select and move VPCs to the 'Not Protected' List to deny ThreatIQ from protecting them.

□ Protected with ThreatIQ
0/6 selected
Filter

	VPC/VNet Name	Cloud	Region
□	VPC A	aws	us-east-1
□	VPC B	aws	us-east-1
□	aws-us-west-2-spoke-1	aws	us-west-2
□	aws-us-west-2-spoke-2	aws	us-west-2
□	aws-us-west-2-spoke-3	aws	us-west-2
□	aws-us-west-2-transit	aws	us-west-2

□ Not Protected
0/0 selected
Filter

VPC/VNet Name	Cloud	Region

Block all future traffic to and from threat IP

When CoPilot sees a Threat IP in the traffic, ThreatIQ rules will be added to block all future traffic from and to the IP.

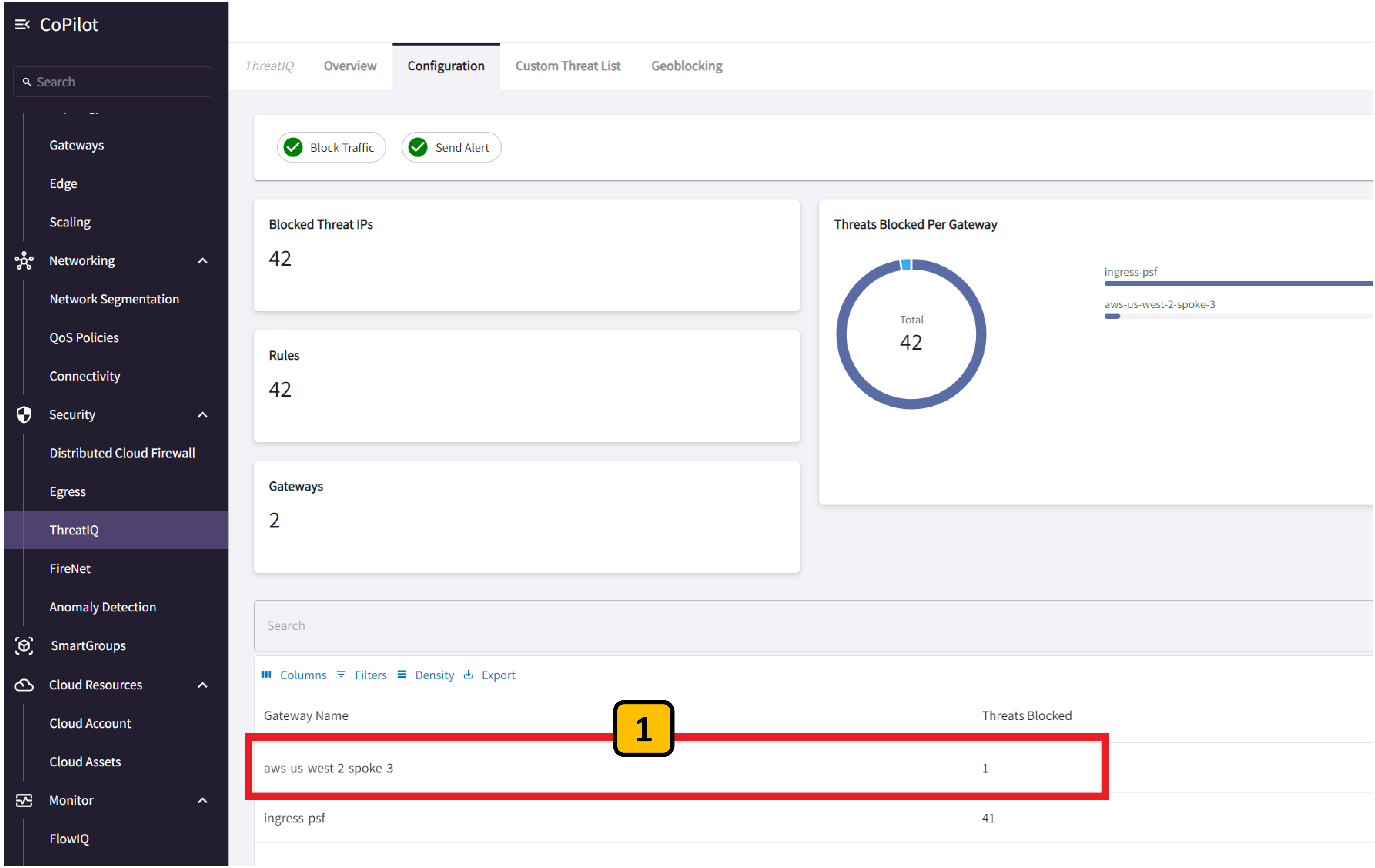
⚠ ThreatIQ blocking will not work on gateways where FQDN-AllowAll is configu

Lab 4: Threat Prevention: Step 4.12

View threat BLOCKING in ThreatIQ

Once enabled, CoPilot will begin blocking any new threat IPs that have been detected.

On the Configuration tab you will see how many threats have been blocked and on which Aviatrix Gateway. 1



Blocked Threat IPs: 42

Rules: 42

Gateways: 2

Gateway Name	Threats Blocked
aws-us-west-2-spoke-3	1
ingress-psf	41

Lab 4: Threat Prevention: Step 4.13

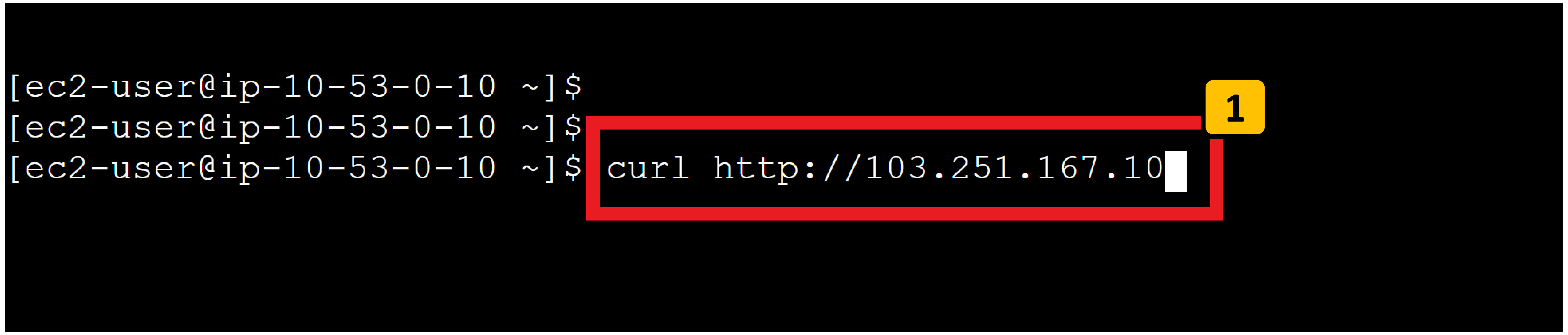
Observe and confirm threat blocking

Go back the Console session of instance SAP 3.

Reconnect to the threat IP using curl:

curl http://103.251.167.10 1

Session ID: Participant-012cbf264a1e61a71   Instance ID: i-01f3d833a2a47c0d3



```
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$ curl http://103.251.167.10
```

Lab 4: Threat Prevention: Step 4.9

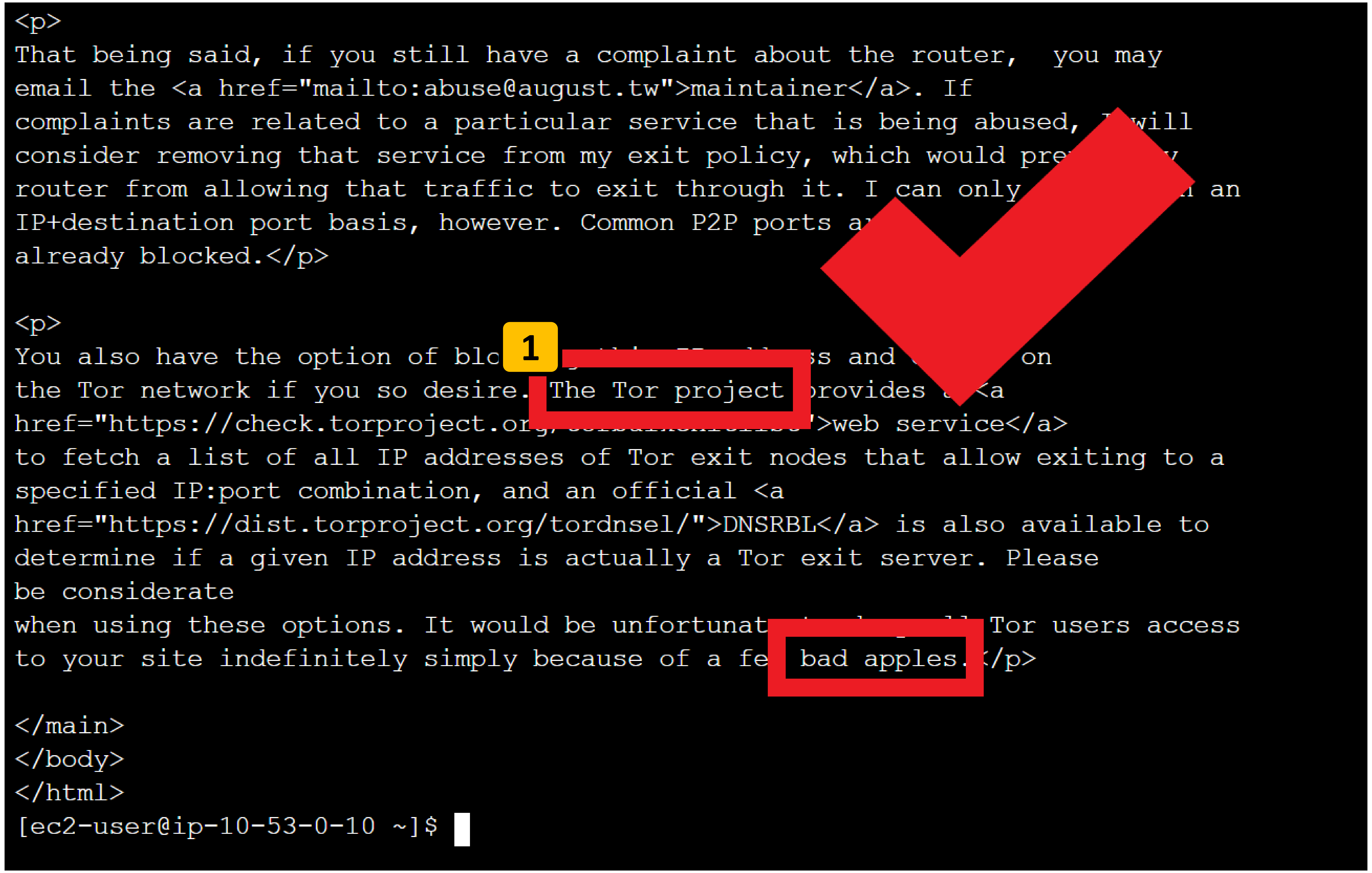
Connect to the abuse IP

The instance should successfully connect to the abuse IP again.

It returns HTML code telling us that it's a TOR Node. 1

Now that threat blocking is enabled, CoPilot will witness these connections again and configure drop rules on your Aviatrix Gateway for the threat IP.

Connect a few times and wait a few minutes…



```
<p>
That being said, if you still have a complaint about the router,  you may
email the <a href="mailto:abuse@august.tw">maintainer</a>. If
complaints are related to a particular service that is being abused, I will
consider removing that service from my exit policy, which would prevent my
router from allowing that traffic to exit through it. I can only filter on an
IP+destination port basis, however. Common P2P ports are
already blocked.</p>

<p>
You also have the option of blocking this IP address and others on
the Tor network if you so desire. The Tor project provides a <a
href="https://check.torproject.org/torbulkexitlist">web service</a>
to fetch a list of all IP addresses of Tor exit nodes that allow exiting to a
specified IP:port combination, and an official <a
href="https://dist.torproject.org/tordnsel/">DNSRBL</a> is also available to
determine if a given IP address is actually a Tor exit server. Please
be considerate
when using these options. It would be unfortunate to deny all Tor users access
to your site indefinitely simply because of a few bad apples.</p>

</main>
</body>
</html>
[ec2-user@ip-10-53-0-10 ~]$
```

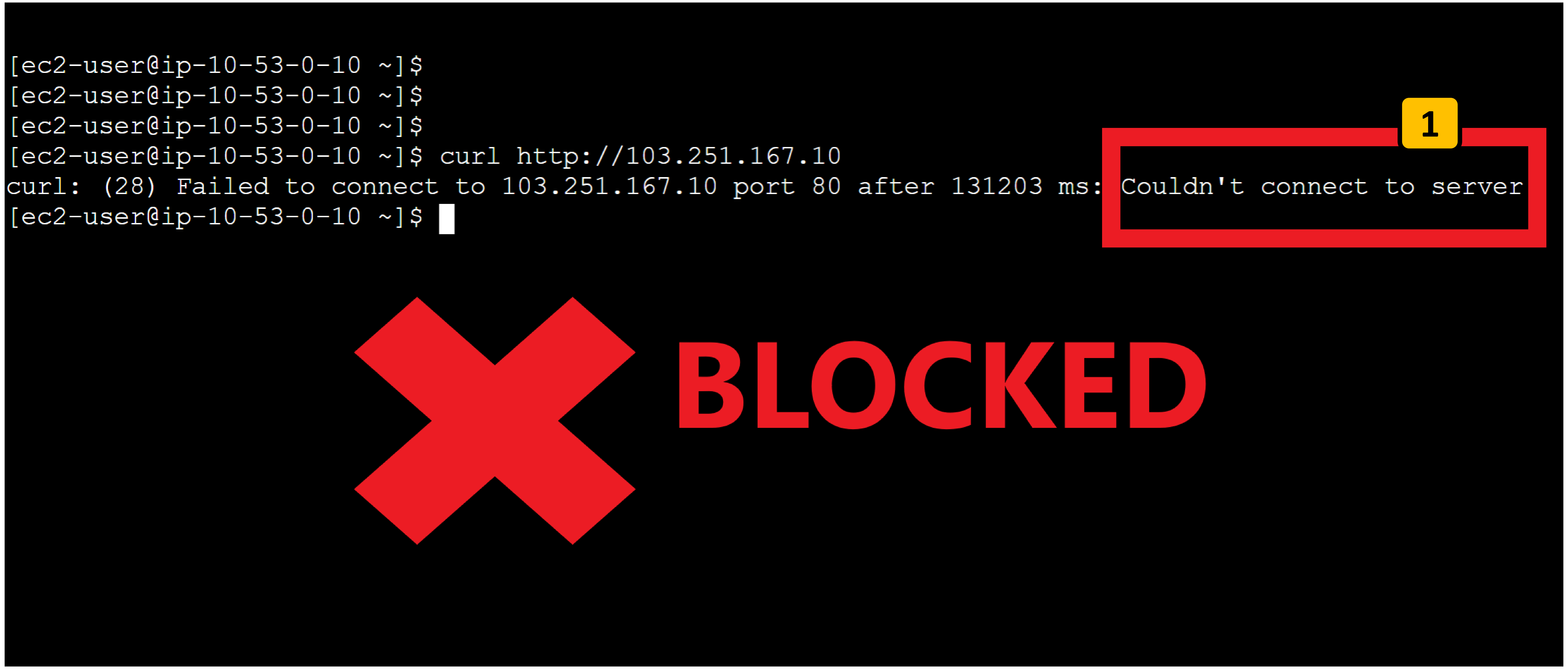
1

Lab 4: Threat Prevention: Step 4.14

Observe and confirm threat blocking

Session ID: Participant-012cbf264a1e61a71

Instance ID: i-01f3d833a2a47c0d3



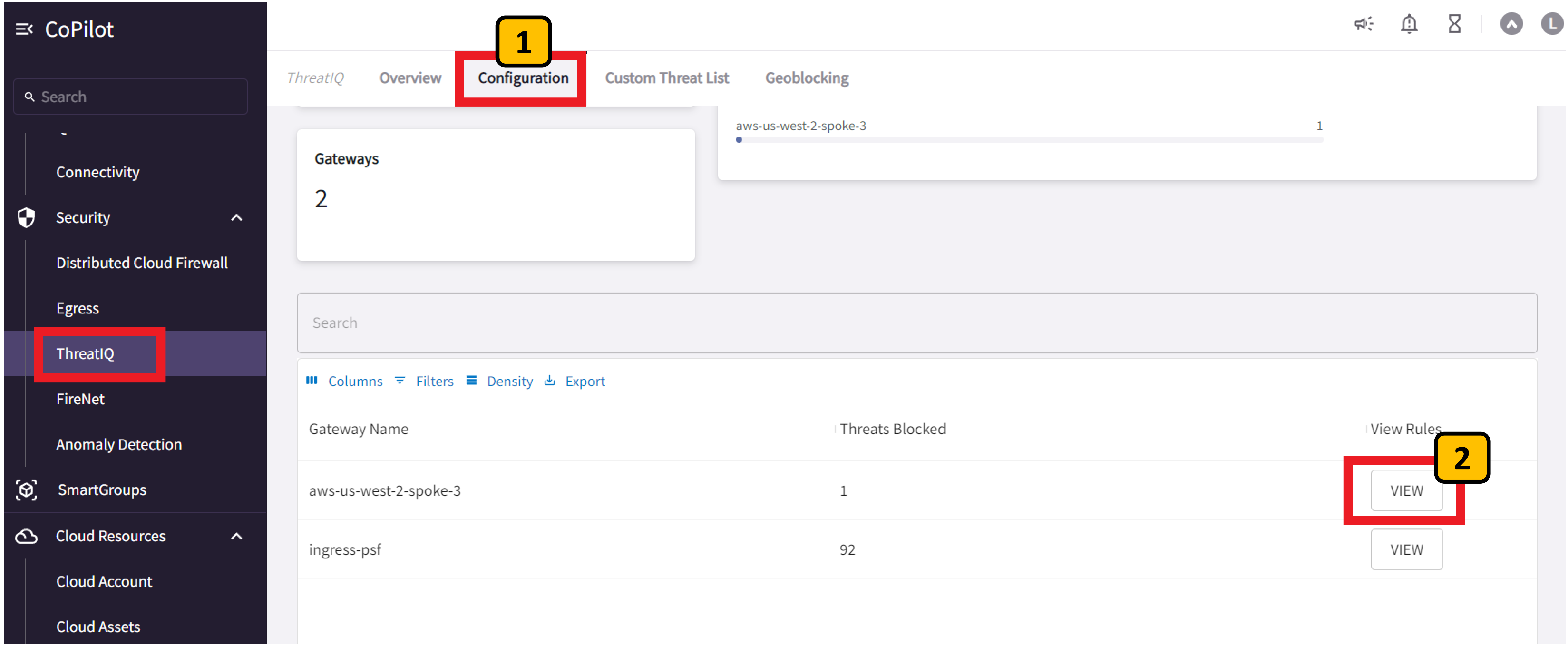
```
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$
[ec2-user@ip-10-53-0-10 ~]$ curl http://103.251.167.10
curl: (28) Failed to connect to 103.251.167.10 port 80 after 131203 ms: Couldn't connect to server
[ec2-user@ip-10-53-0-10 ~]$
```

After a few minutes of you should being to see your connections to this threat IP fail. 1

Aviatrix CoPilot has detected the threat connection and automatically blocked it as you've requested!

Lab 4: Threat Prevention: Step 4.15

Observe and confirm threat blocking



Gateways
2

Gateway Name	Threats Blocked	View Rules
aws-us-west-2-spoke-3	1	VIEW
ingress-psf	92	VIEW

Go to the Configuration tab of ThreatIQ to view the blocks that have happened. 1

Find the aws-us-west-2-spoke-3 gateway with threats blocked and click **View** 2

Lab 4: Threat Prevention: Step 4.16

Observe and confirm threat blocking

ThreatIQ
Overview
Configuration
Custom Threat List
Geoblocking
Columns
Filters
Density
Export
1
1

aws-us-west-2-spoke-3

Source IP	Destination IP	Port	Protocol	Description	Action	Delete
103.251.167.10/32	n/a	ALL	ALL	ipset rule	force-drop	

You should see the threat IP you connected to listed in a drop rule configured on this Aviatrix Gateway handing internet traffic for the instance SAP 3 1

Imagine this happening at 3am. You can continue to sleep while CoPilot protects your network.

Nobody will need to page you to wake up and write a firewall rule at 3am!

Lab 4: Checkpoint 2: Current State

10.51.0.0/16
Spoke 1
Jump Instance
10.51.0.10
SAP1
10.52.0.0/16
Spoke 2
PROD
10.52.0.10
SAP2
10.52.0.0/16
Spoke 3
10.53.0.10
SAP3
Transit
10.50.0.0/16
AWS us-west-2
Internet
LEGITIMATE TRAFFIC
Customers, Partners, etc.
THREATS
TOR Nodes
Known Bad Actors
UNKNOWN GEOS
Questionable Countries
Adversaries
Controller VPC
Aviatrix CoPilot
Aviatrix Controller
AWS us-east-1

At this point you've allowed the PROD group of instances to connect to the open internet while also **automatically blocking connections to known threat IPs**.

<u>However</u>: The PROD instances can still connect to geographies you many not want them to connect to.

Let's address this issue using Geo-blocking…

Lab 4: Threat Prevention: Step 4.17

Block geographies using Geoblocking

CoPilot
Search
Connectivity
Security
Distributed Cloud Firewall
Egress
ThreatIQ
FireNet
Anomaly Detection
SmartGroups
ThreatIQ
Overview
Configuration
Custom Threat List
Geoblocking
1
Show Only Blocked Countries
Cancel
Save
3
Sea
2

	Countries	Status	IPs Observed (Last 7 Days)	Modified On
AF	Afghanistan	Allowed	1	
AL	Albania	Allowed	5	
DZ	Algeria	Blocked	46	
AS	American Samoa	Allowed		
AD	Andorra	Allowed		
AO	Angola	Allowed	13	

Go to the **Geoblocking** tab of ThreatIQ and you will see a long list of countries and how many IPs have been observed from them on your network. 1

Pick a country to block by clicking the Allowed switch to change it to Blocked 2

Click **Save**. 3

Lab 4: Threat Prevention: Step 4.18

Block geographies using Geoblocking

CoPilot

Search

Connectivity

Security

Distributed Cloud Firewall

Egress

ThreatIQ

FireNet

Anomaly Detection

ThreatIQ | Overview | Configuration | Custom Threat List | Geoblocking

Show Only Blocked Countries

Search

	Countries	Status	IPs Observed (Last 7 Days)	Modified On
AF	Afghanistan	Allowed	1	
AL	Albania	Allowed	5	
DZ	Algeria	Blocked	46	Aug 15, 2023 11:27 PM
AS	American Samoa	Allowed		
AD	Andorra	Allowed		

1

Any new connections from the chosen country will be detected by CoPilot and subsequently blocked, just like you observed with the threat IP. 1

aviatrix aws

Lab 4: Complete: Current State

10.51.0.0/16
Spoke 1
Jump Instance
10.51.0.10
SAP1

10.52.0.0/16
Spoke 2
PROD
10.52.0.10
SAP2

10.52.0.0/16
Spoke 3
10.53.0.10
SAP3

Transit
10.50.0.0/16

AWS us-west-2

Internet

LEGITIMATE TRAFFIC
Customers, Partners, etc.

THREATS
TOR Nodes
Known Bad Actors

UNKNOWN GEOS
Questionable Countries
Adversaries

Controller VPC
Aviatrix CoPilot
Aviatrix Controller

AWS us-east-1

At this point you've allowed the PROD group of instances to connect to the open internet while also **automatically blocking connections to known threat IPs … AND … automatically blocking chosen geographies!**

Super easy, right?

The easier it is to setup security, the more likely it is your network will be properly secured.

Lab 4: Success

10.51.0.0/16
Spoke 1
Jump Instance
10.52.0.0/16
Spoke 2
PROD
10.52.0.0/16
Spoke 3
10.51.0.10
SAP1
10.52.0.10
SAP2
10.53.0.10
SAP3
Transit
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Aviatrix CoPilot
Aviatrix Controller
AWS us-east-1

SUCCESS!! You completed Lab 4!

You're awesome.

You just automated reputation-based threat prevention and geo fencing. How cool is that??