Security

SOLUTIONS ENGINEERING

www.aviatrix.com

Agenda

- Aviatrix Security Features Overview
- Securing Aviatrix Platform
- Egress
- Public Subnet Filtering Gateway

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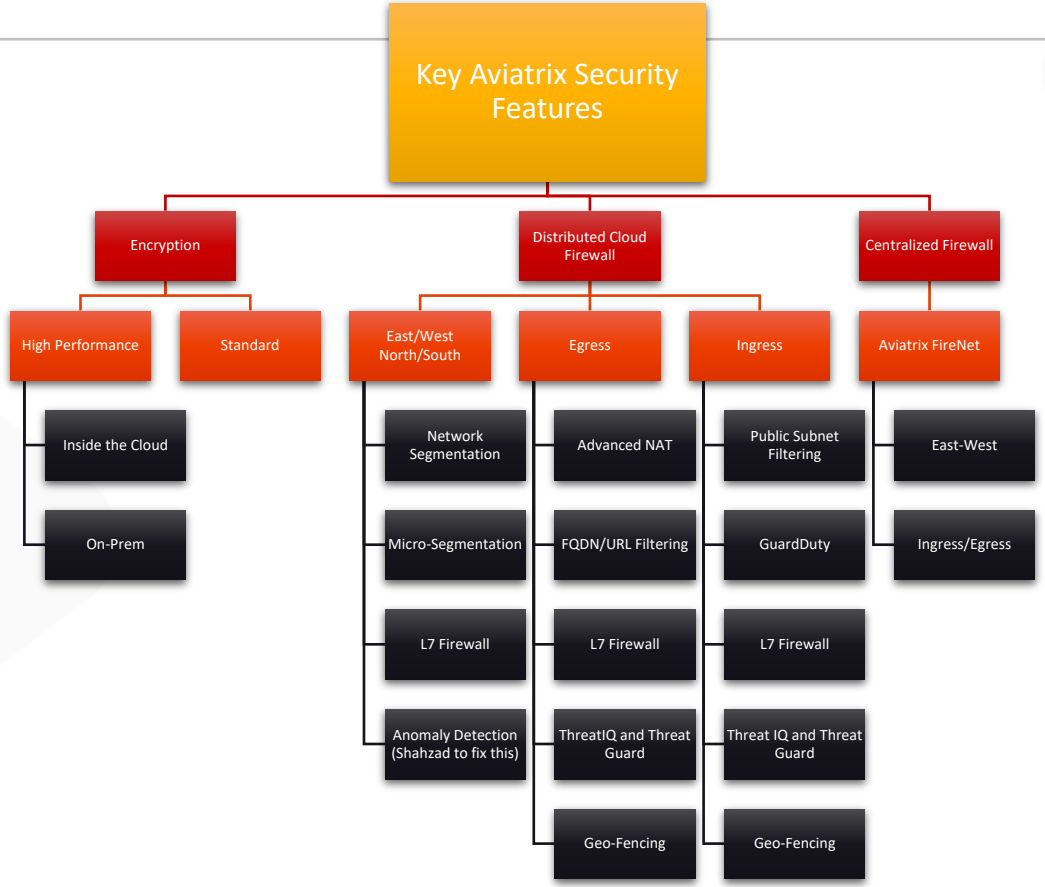
Challenges for CISO, CIO/CTO and NetSec Architects

- Apps/Business requirements dictate the Multi-Cloud
  - Some Apps simply operate better in one cloud vs another
  - New Customer Requirements a particular cloud OR M&A
- **Security and Compliance is NOT shared responsibility**
  - It is YOUR responsibility
- SaaS or Managed Services are often a Black-Boxes
- Understaffed Team, Skill Gap and Learning Curve issue
- Time-to-Market causes short-cuts
- Hacked or Not, doesn't matter Audit will happen regardless

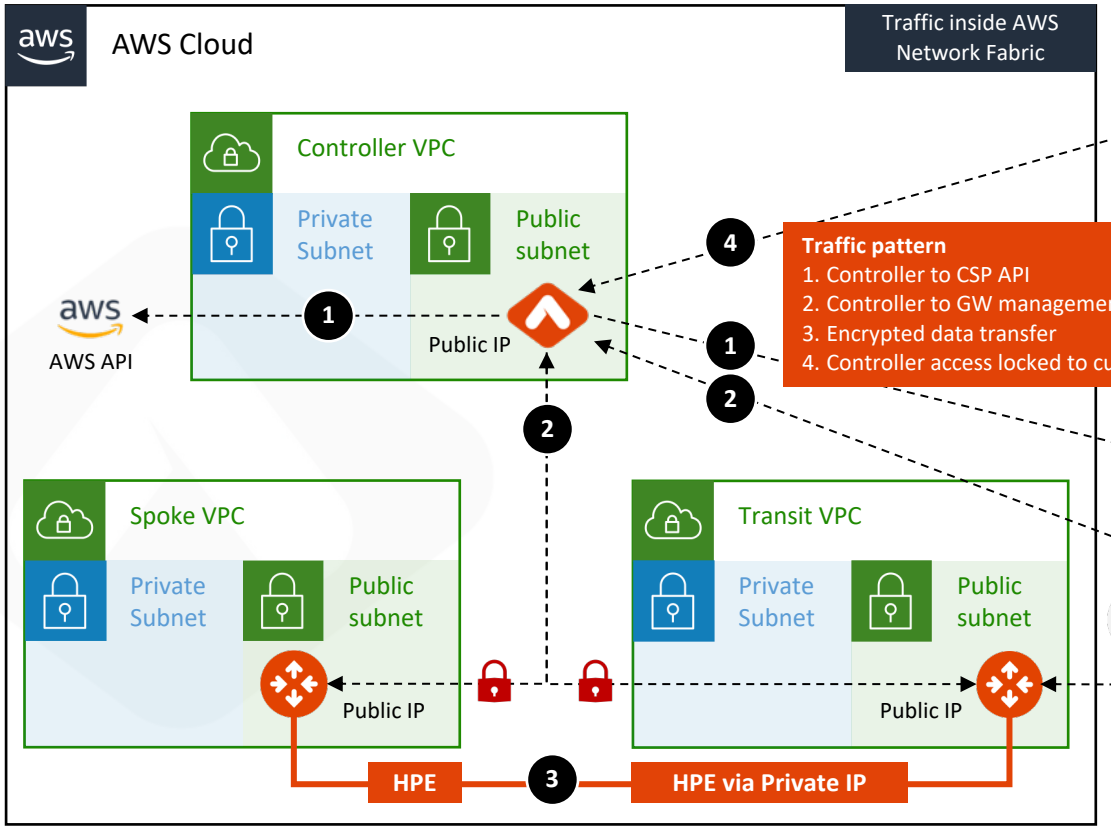
https://aviatrix.com/resources/ebooks/security-architects-guide-multi-cloud-networking-v2

Summary


Key Aviatrix Security Features
Encryption
Distributed Cloud Firewall
Centralized Firewall
High Performance
Standard
East/West North/South
Egress
Ingress
Aviatrix FireNet
Inside the Cloud
On-Prem
Network Segmentation
Micro-Segmentation
L7 Firewall
Anomaly Detection (Shahzad to fix this)
Advanced NAT
FQDN/URL Filtering
L7 Firewall
ThreatIQ and Threat Guard
Geo-Fencing
Public Subnet Filtering
GuardDuty
L7 Firewall
Threat IQ and Threat Guard
Geo-Fencing
East-West
Ingress/Egress

Built-in Security of the Aviatrix Platform

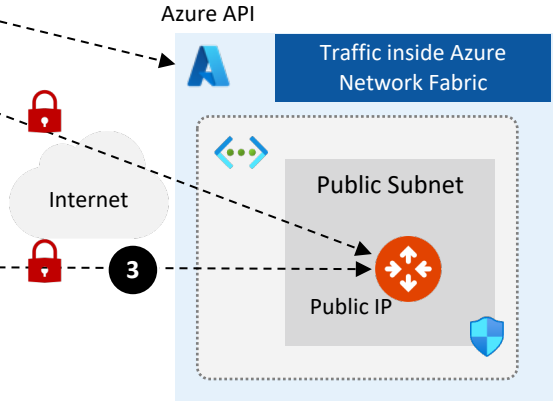
Secure Aviatrix Infrastructure Deployment | Example in AWS & Azure



Traffic pattern
1. Controller to CSP API
2. Controller to GW management traffic
3. Encrypted data transfer
4. Controller access locked to customer IP

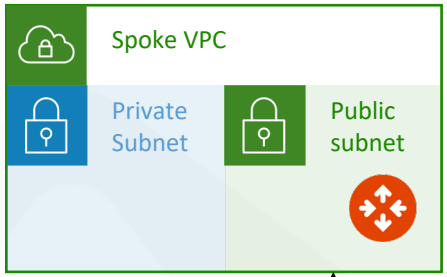
Infra Security Controls
a. Subnet monitoring & notification
b. Automatic Security Group lockdown (Controller → GW, GW → GW)
c. SAML-based RBAC with MFA

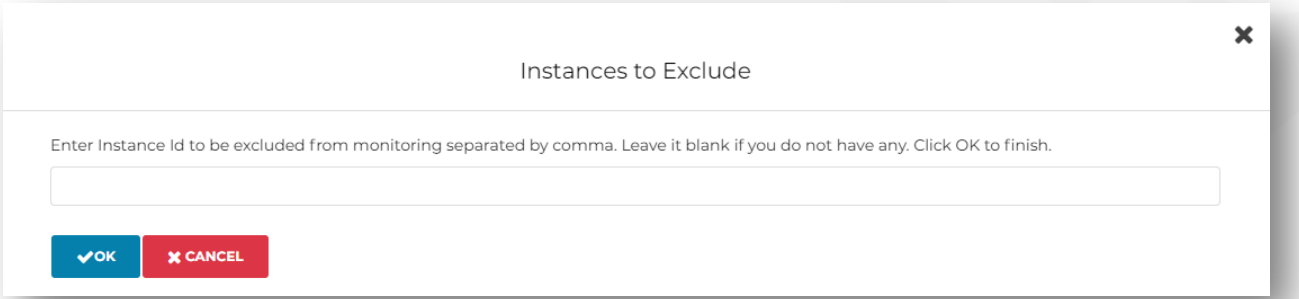
Appliance Security
i. OS Lockdown (hardened: no SSH, limited daemons, etc.)
ii. EBS Encryption
iii. FIPS, NESSUS, InfoSec Policy, Pen Testing
iv. Hitless software/security patching

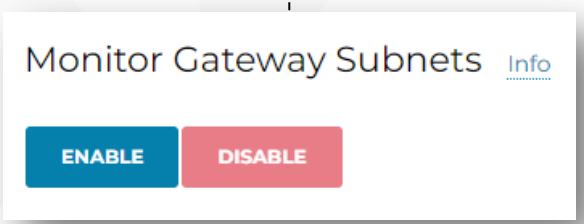


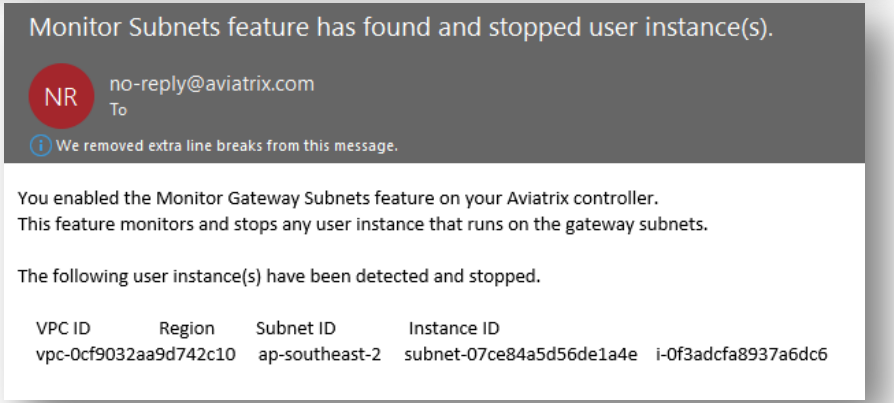
Monitor Gateway Subnets

Prevents unauthorized VMs from being launched in the same subnet as the gateways









https://docs.aviatrix.com/HowTos/gateway.html#monitor-gateway-subnet

Controller Security Group Management | Automatic Security Group lockdown

Instance: i-0ea8d13e979fb9be6 (ss-controller)

▼ Inbound rules

Filter rules

Security group rule ID	Port range	Protocol	Source	Security groups
sgr-01ffba9d6c84d825d	443	TCP	3.106.76.93/32	ss-controller-AviatrixSG-YHFSUVZBB...
sgr-0a11c67bf190b7be7	443	TCP	3.105.63.97/32	Aviatrix-SG-54.206.174.209
sgr-0a8ccee5ee8d489ee	443	TCP	3.104.18.207/32	Aviatrix-SG-54.206.174.209

Instance: i-042eb8b6912e0acc0 (aviatrix-spoke1)

Security groups

sg-09ef033544630561b (spoke1)

▼ Inbound rules

Filter rules

Security group rule ID	Port range	Protocol	Source	Security groups
sgr-0288b5beddfa495b2	All	All	10.1.1.0/24	spoke1
sgr-03e3c293b614e73c7	443	TCP	54.206.174.209/32	spoke1

Securing the Platform with Cloud Native Load Balancers

Problem Statement

- Enterprise concerns around putting Aviatrix Controller with a public IP in a Public subnet
- Enterprises need tighter security and availability
- What are the options?

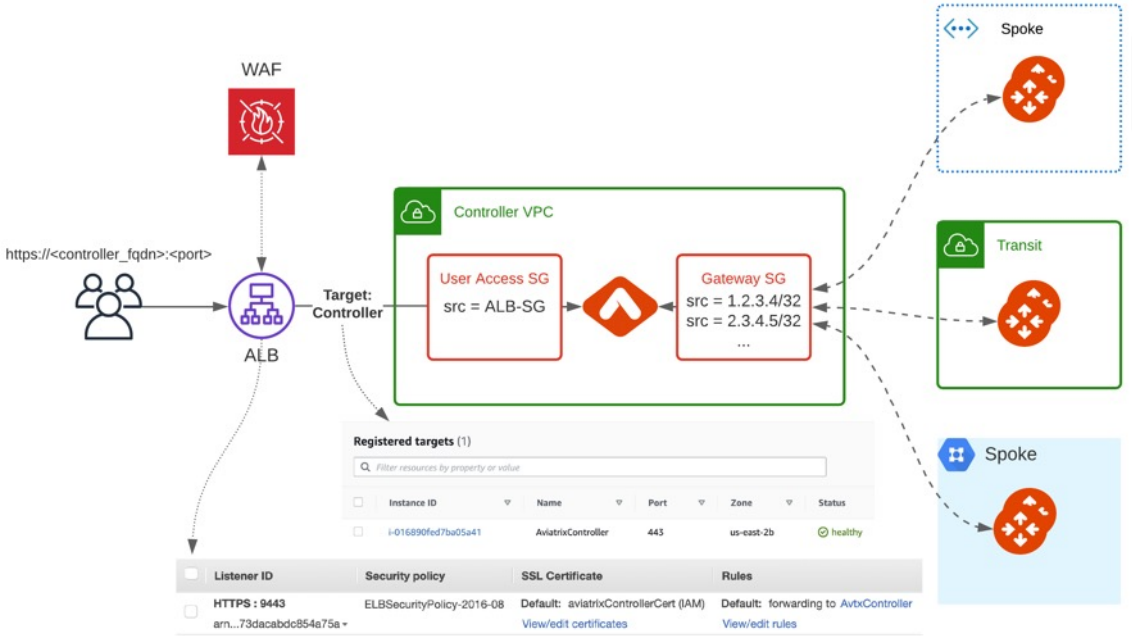
1. Limit access using cloud native L4 stateful firewalls such as:
    - AWS Security Groups
    - Azure Network Security Groups
    - GCP Firewall Rules
2. Deploy a third-party Firewall in front of controller
3. Deploy an Application (L7) Load Balancer in front of Aviatrix Controller

Advantages: L7 Load Balancer in Front of Aviatrix Controller

- **Limit management access to Controller**
  - Only allow access from the LB internal IPs to Controller on port 443
- **WAF capability on LBs**
  - Stops usual web hacks/attacks against controller
- **L7 LB managing Controller certificate**
  - Potentially terminating the SSL connection on LB [cloud native process]
- **Adhere to SoPs and best practices**
  - Around alerts, operational features, logging integration, etc.
  - Putting an LB in front means Controller access can fit right into your existing operational model
- **Leverage LB health checks**
  - Monitor the Controller at an application layer
  - If the LB health check goes down, it again fits right into existing operational best practices and SoPs of customer making it easier for them to monitor the control plane
- Any access to controller, including API, UI login, etc., would go through LB, and the LB logging can provide easier, faster integration to existing tools

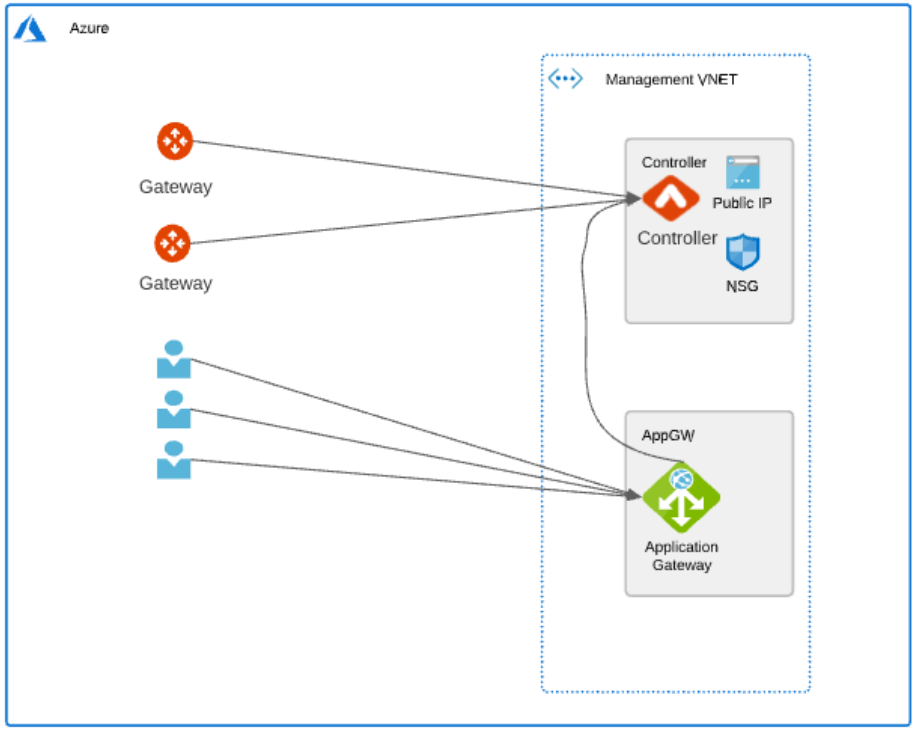
AWS

- Enable Controller Security Group Management to only allow access to the Controller EIP from Aviatrix Gateways
- Create a new internet facing ALB
- Modify main Controller Security Group to only allow access from the ALB Security Group
- Enable WAF on the ALB with AWS Managed Rules
- Adjust ALB idle timeout, modify rulesets
- Modify ALB Security Group to only allow access from the admin user IP



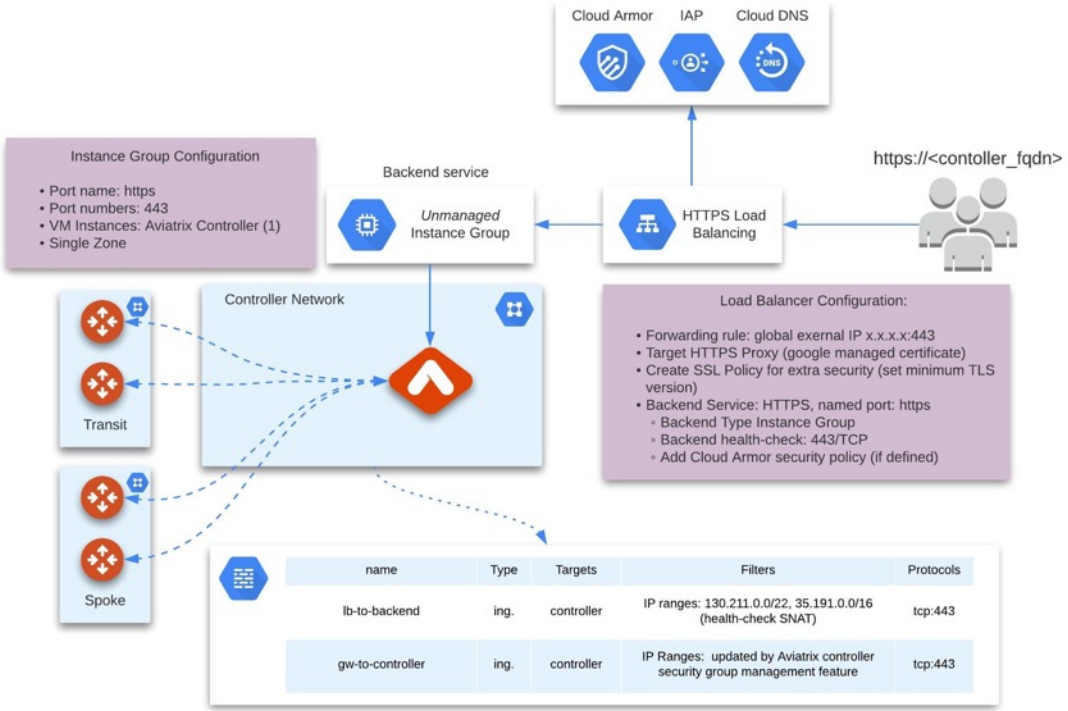
Azure

- Use WAF with Azure Managed rules on Application Gateway to limit usual web hacks/attacks against Controller
- Only allow user access from the Application Gateway subnet to Controller on port 443 (Controller Security Groups management feature is a pre-requisite for gateway communication to Controller)
- Allow configuring user access on non-standard HTTPS listener port
- Terminate SSL connection on Application Gateway to leverage cloud native certificate management and WAF capability to inspect and log requests
- L7 health-check on the Controller



GCP

- Create Cloud DNS public Zone for controller domain
- Create instance group and add controller to it
- Configure Cloud Armor Policy
- Create external HTTPS load-balancer
- Add Firewall rules to allow LB health-check to backend service from prefixes
  - 130.211.0.0/22
  - 35.191.0.0/16
  - Set appropriate target Tag (matching Controller VM instance *network tag*)



Secure Egress

Problem Statement

Private workloads need internet access

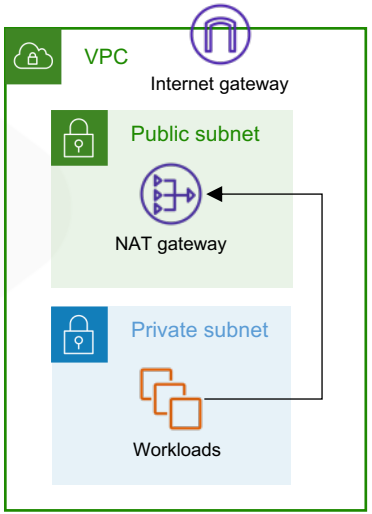
- **SaaS integration**

- **Patching**

- **Updates**

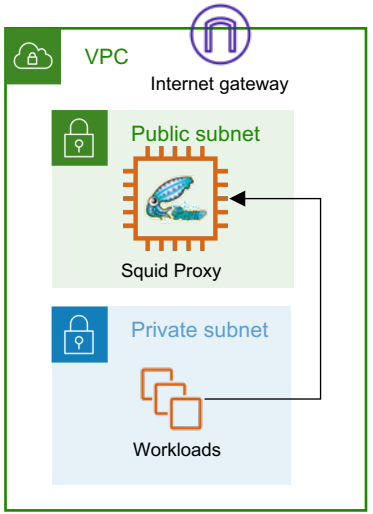
NAT Gateway

- NACLs management
- Layer-4 only



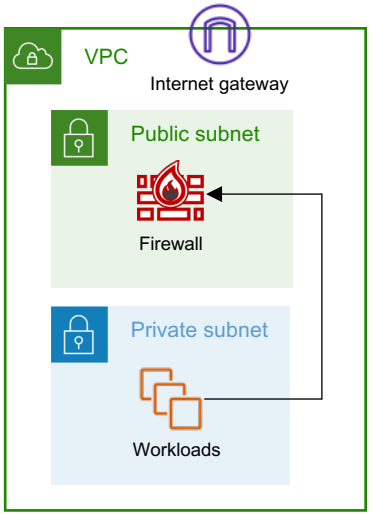
Squid Proxy

- Hard to manage
- Scale and HA issues

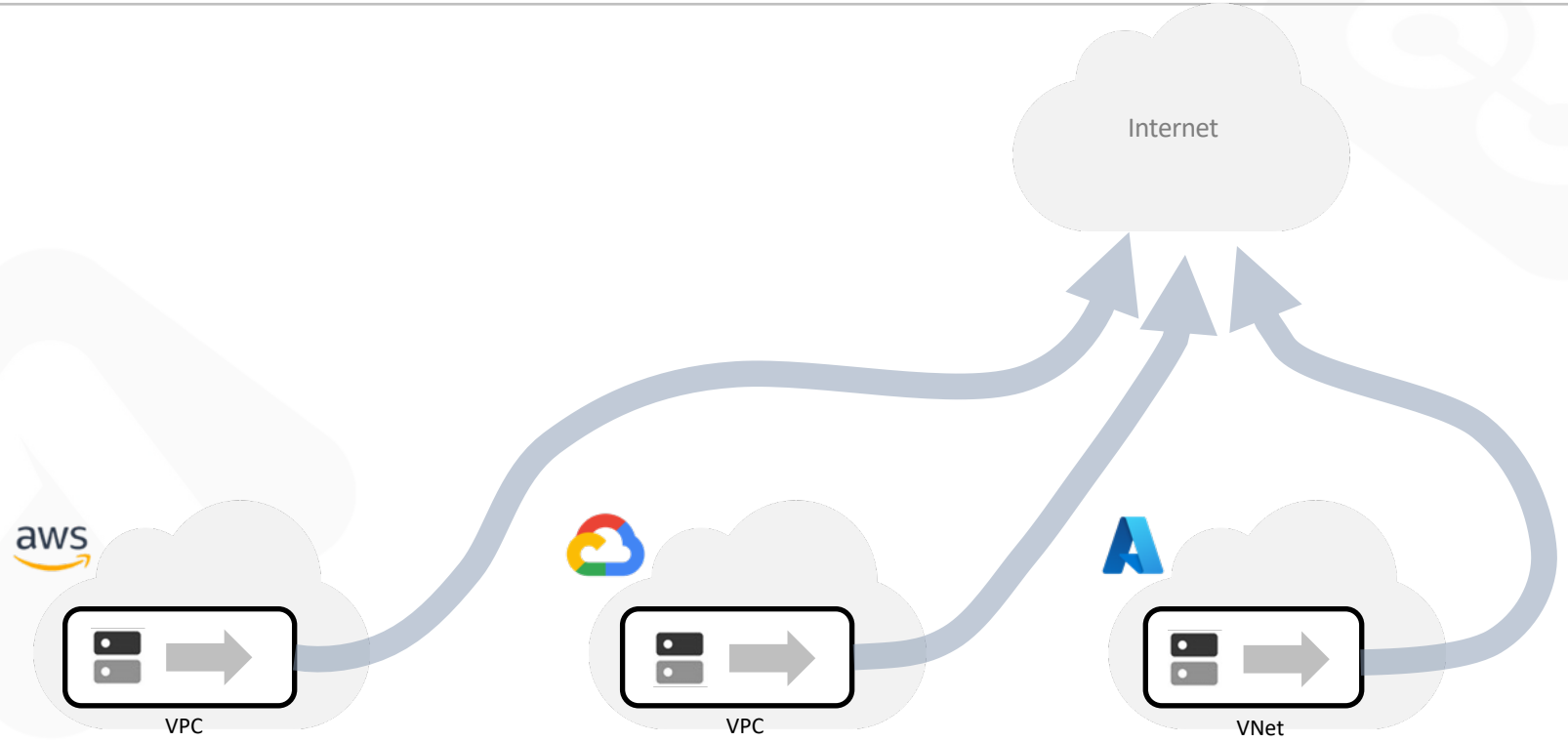


Layer-7 Firewall

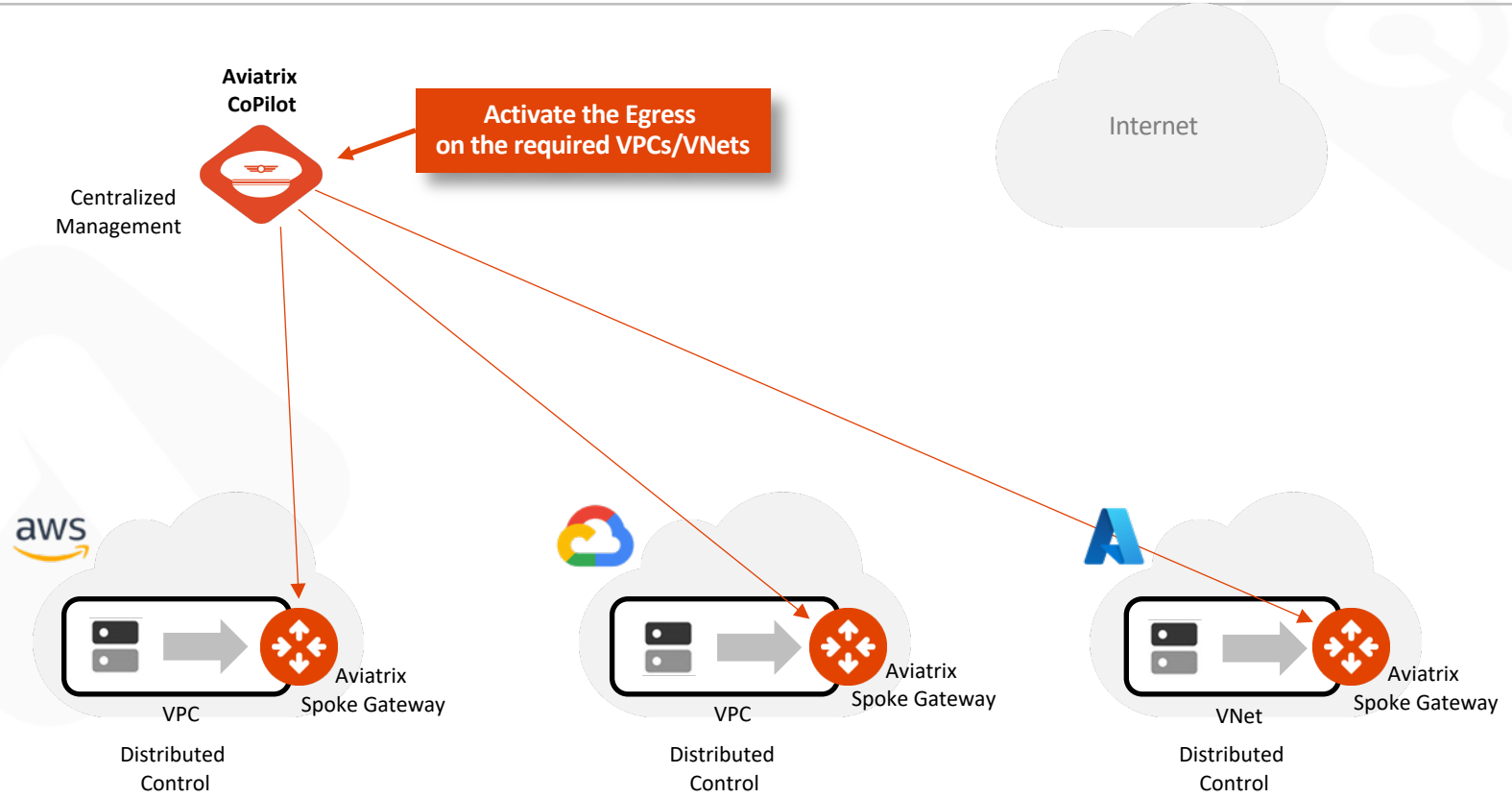
- Overkill
- Expensive



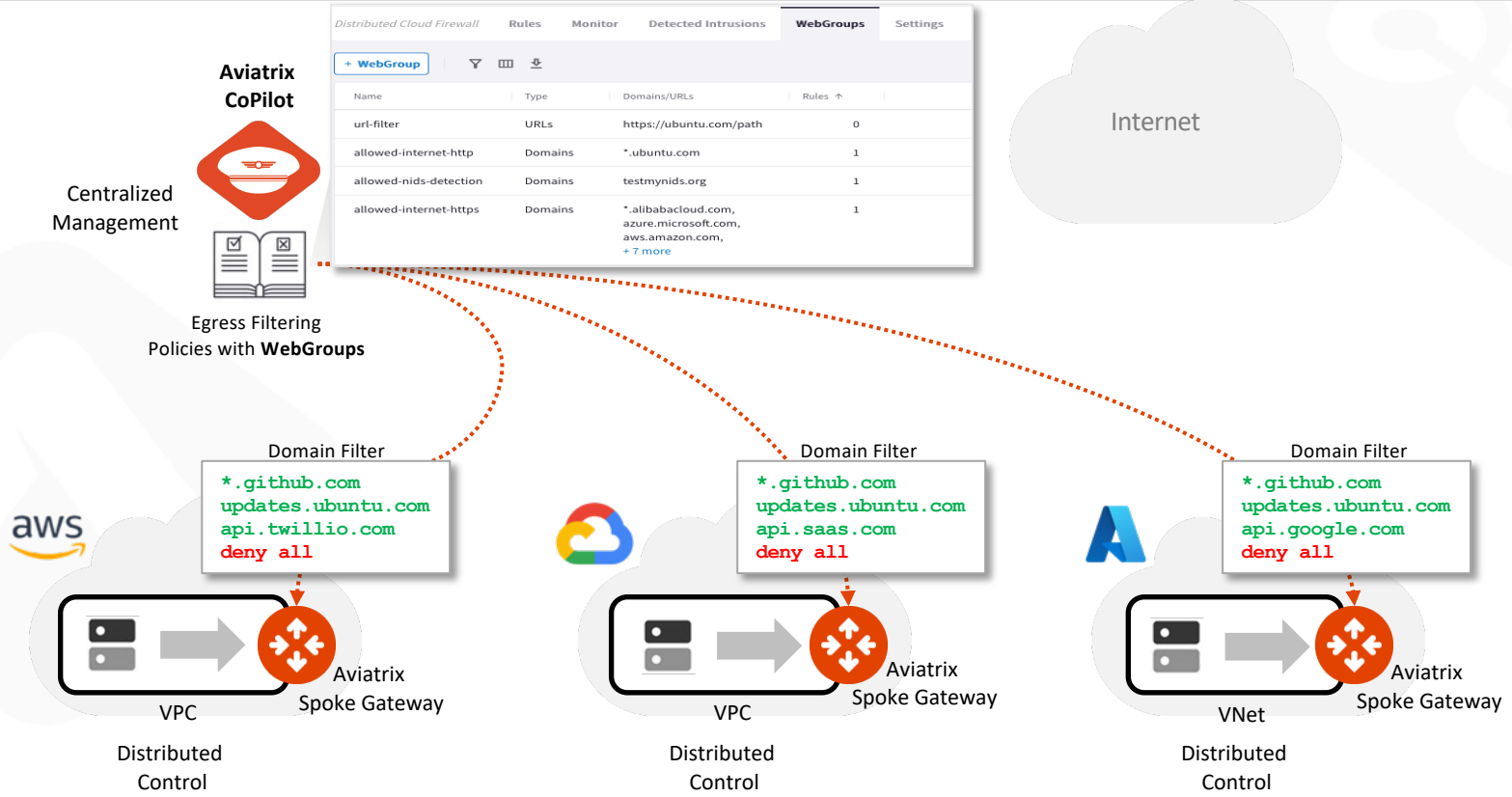
Aviatrix Secure Egress Filtering Feature



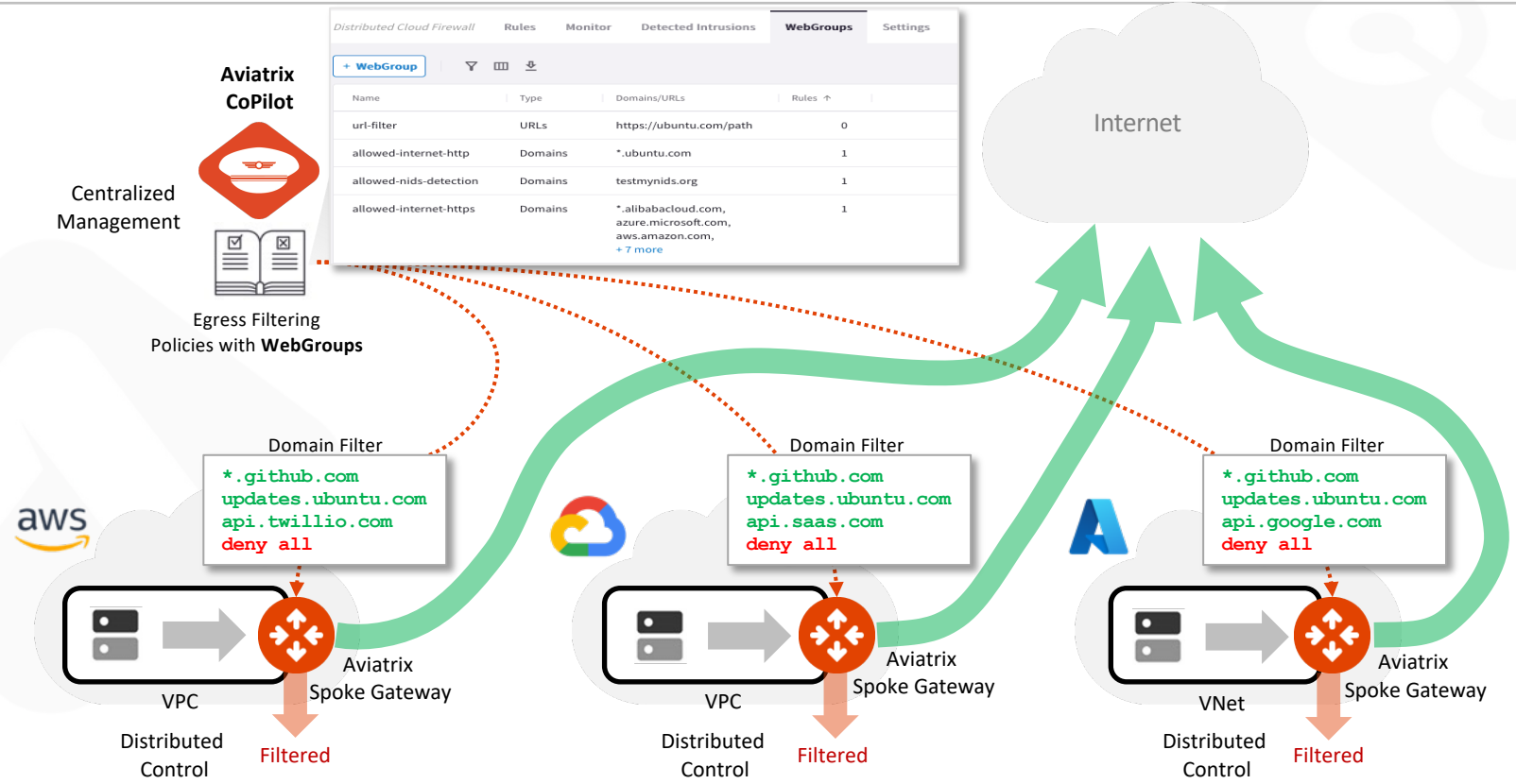
Aviatrix Secure Egress Filtering



Aviatrix Secure Egress Filtering

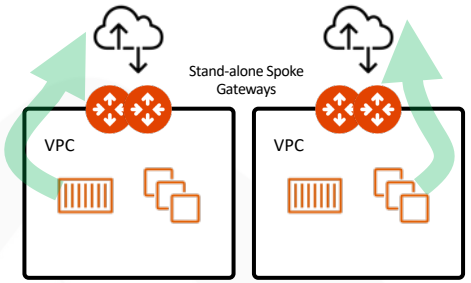


Aviatrix Secure Egress Filtering

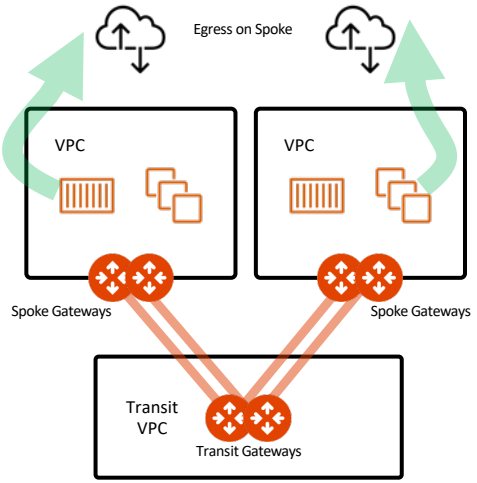


Aviatrix Secure Egress Filtering Design Patterns

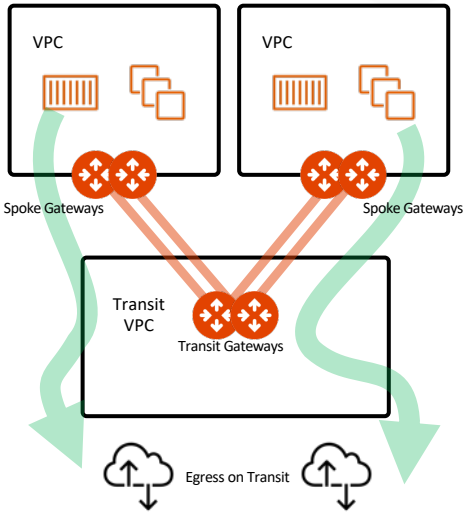
Stand-alone Spoke GW (Distributed)



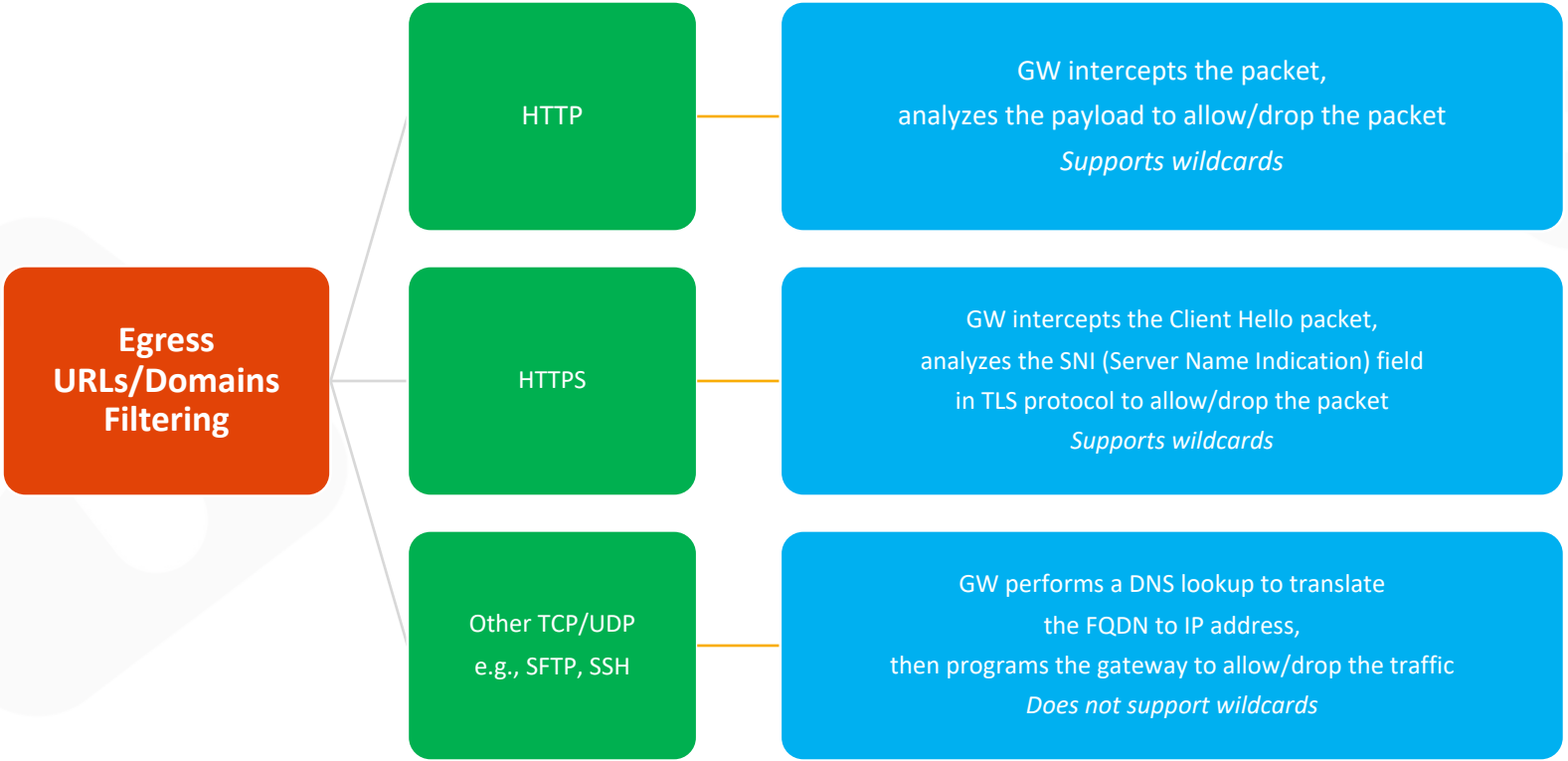
Local Egress (Distributed) with Aviatrix Spoke GW



Centralized Egress with Aviatrix Transit GW

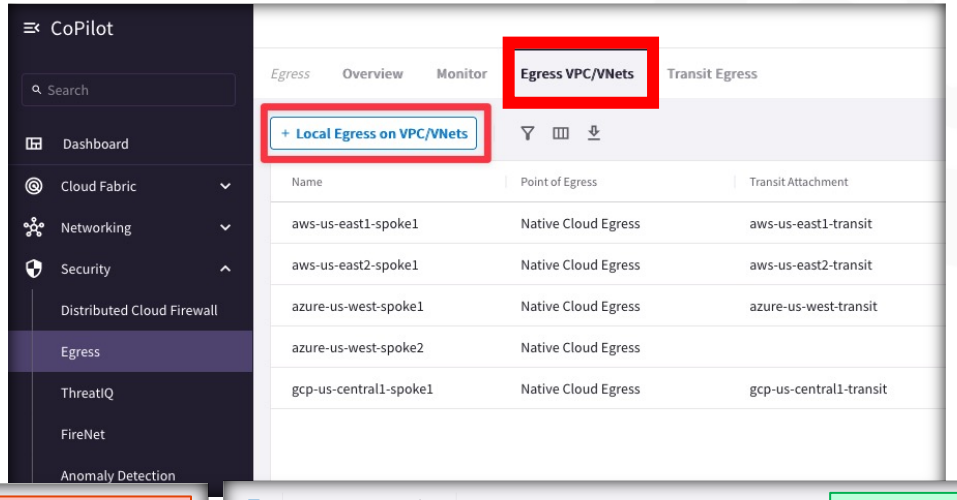


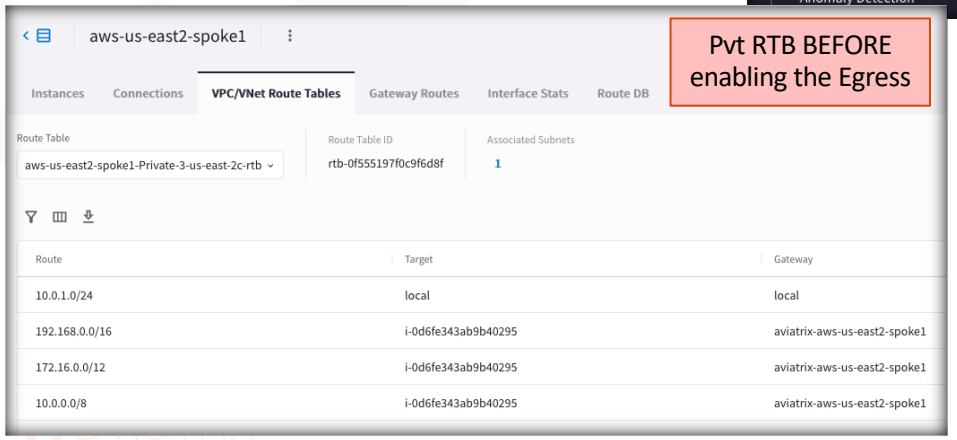
Egress FQDN Filter – Traffic Types

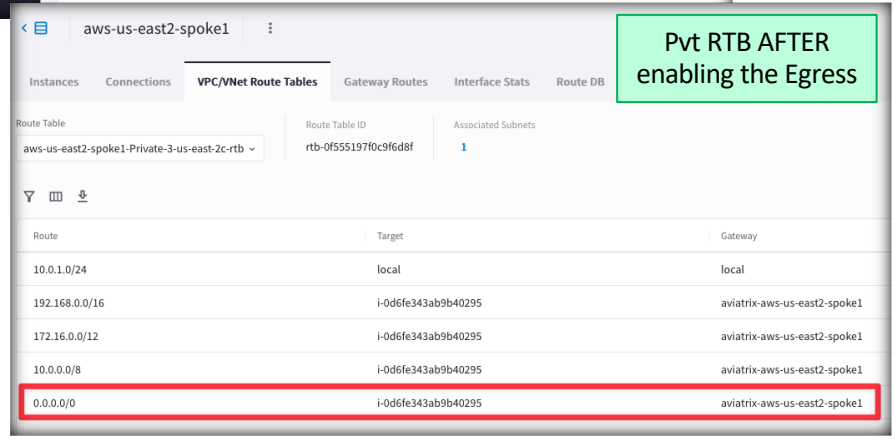


Enabling Egress

- Adding Egress Control on VPC/VNet changes the default route on VPC/VNet to point to the Spoke Gateway and enables **SNAT**.
- In addition to the **Local route**, the **three RFC1918 routes**, also a **default route** will be injected.
- CAVEAT: Egress Control also requires additional resources on the Spoke Gateway (i.e. scale up the VM size). Before enabling Egress Control on Spoke Gateways, ensure that you have created the additional CPU resources on the Spoke Gateway required to support Egress Control.

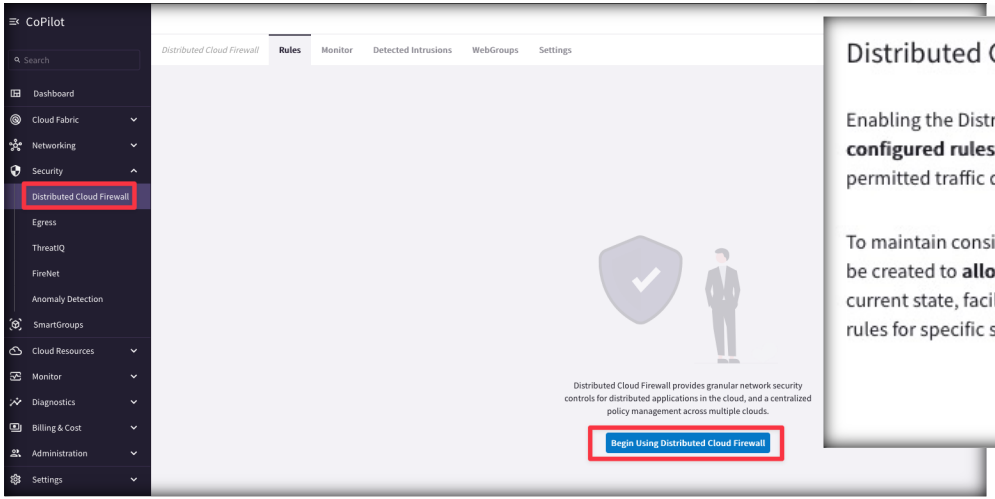


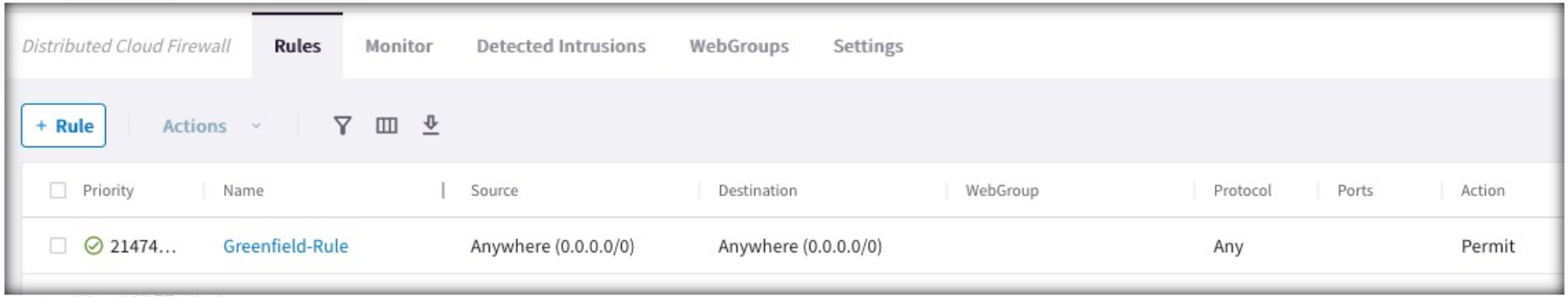




The Greenfield-Rule = Deny-List Model

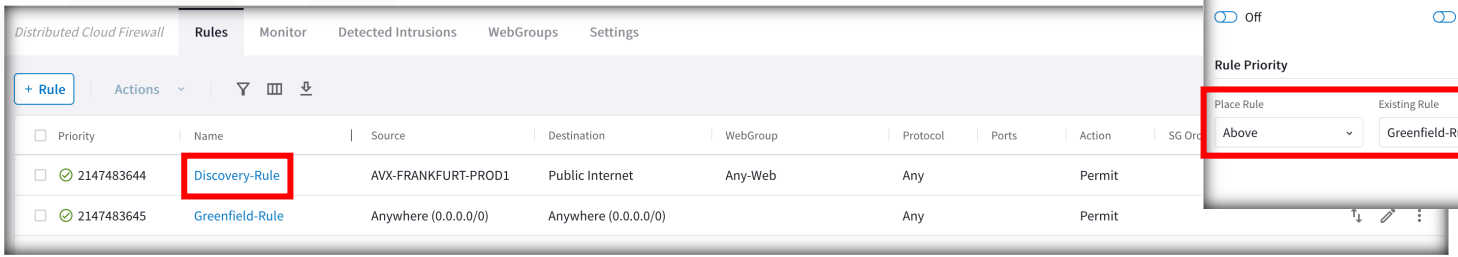
- If you want to apply policies on your Egress traffic, you must enable the Distributed Cloud Firewall.
- The Egress control requires the activation of the Distributed Cloud Firewall.
- The **Greenfield-Rule** is automatically added to allow all kind of traffic.
- *Best Practice:* do not edit this rule, although it can be recreated if it is accidentally deleted.

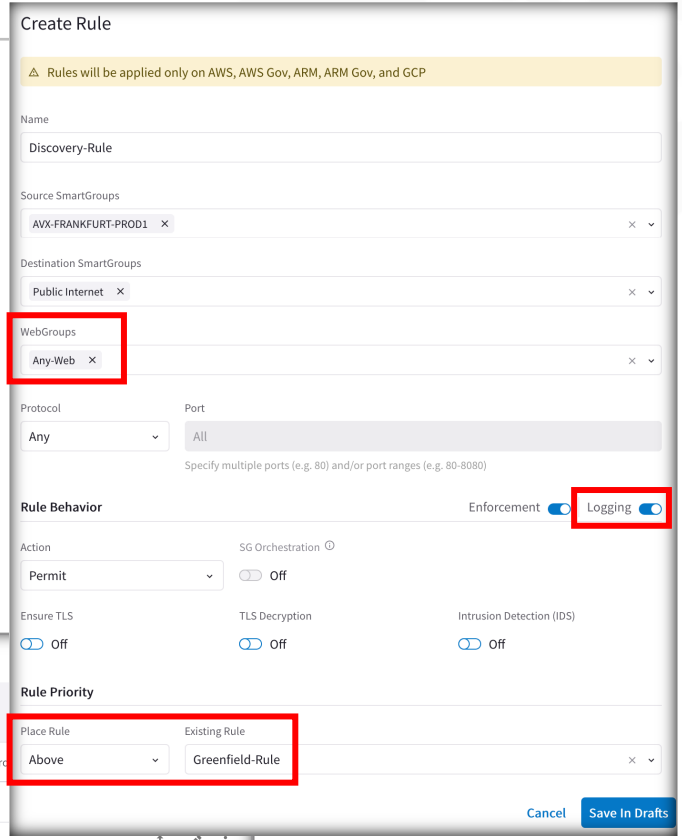




Discovery Process

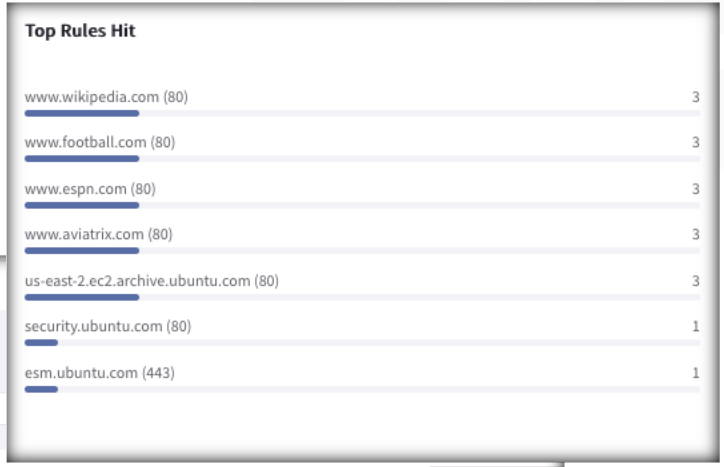
- If you don't know the sites that your applications visit, an ad-hoc *Discovery-Rule* can be enabled, temporarily.
  a) Attach as *Source SmartGroup*, the SmartGroup that is identifying the private workloads affected by the Egress feature, previously enabled.
  b) Attach as *Destination SmartGroup*, the Predefined SmartGroup **"Public Internet".**
  c) Attach the Predefined ***Any-Web*** WebGroup.
  d) Turn On the ***"Logging"*** toggle
- The *Discovery-Rule* allows to intercept the logs generated only by HTTP (port 80) and HTTPS (port 443) traffic, from the VPC where the Egress control was enabled.
- *Best Practice*: Place your Discovery-Rule always above the Greenfield-Rule.
- The result will be display on the ***Monitor*** TAB.

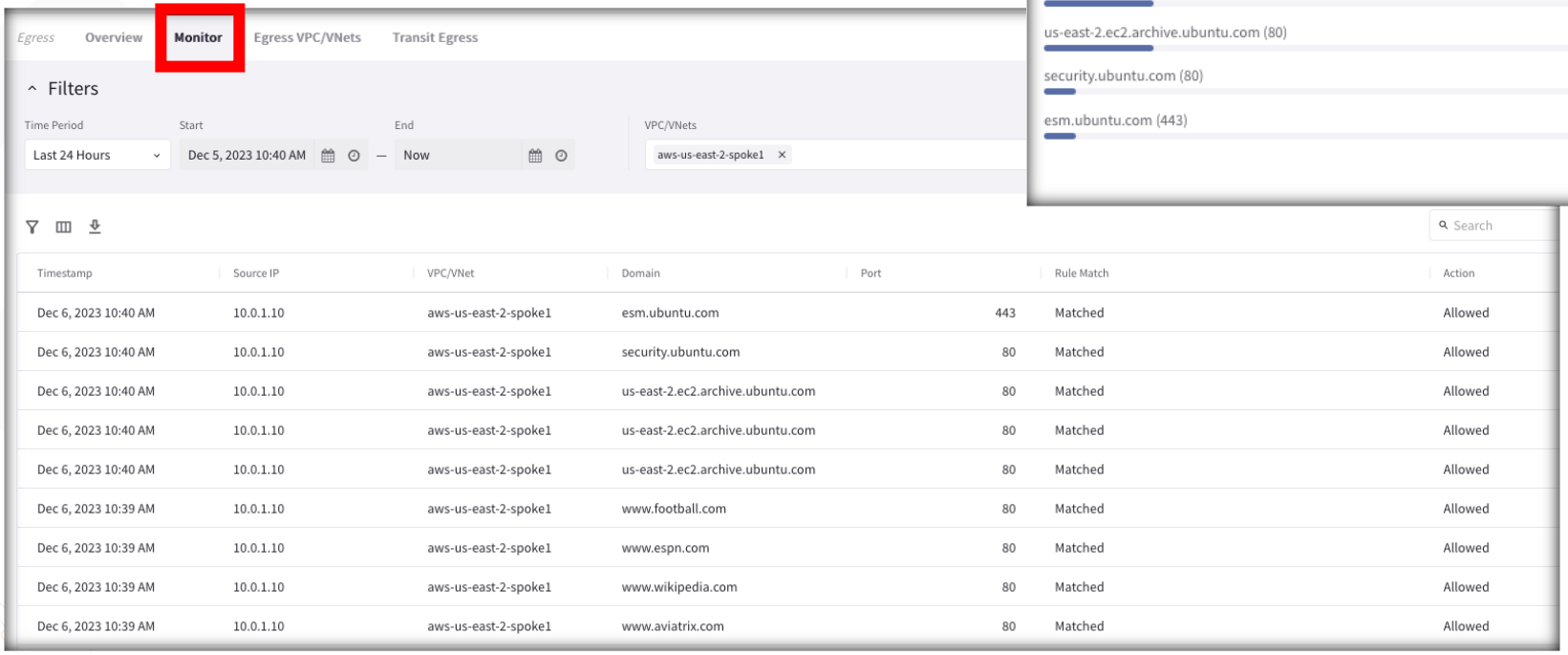




Monitor

- On the Monitor section you can retrieve all the logs and therefore distinguish the domains tha should be permitted from those that should be denied
- Best Practice: *The Discovery Process* should be used only temporarily. As soon as you have completed your discovery, kindly proceed to activating the *Allow-List model (i.e. ZTN approach)*.

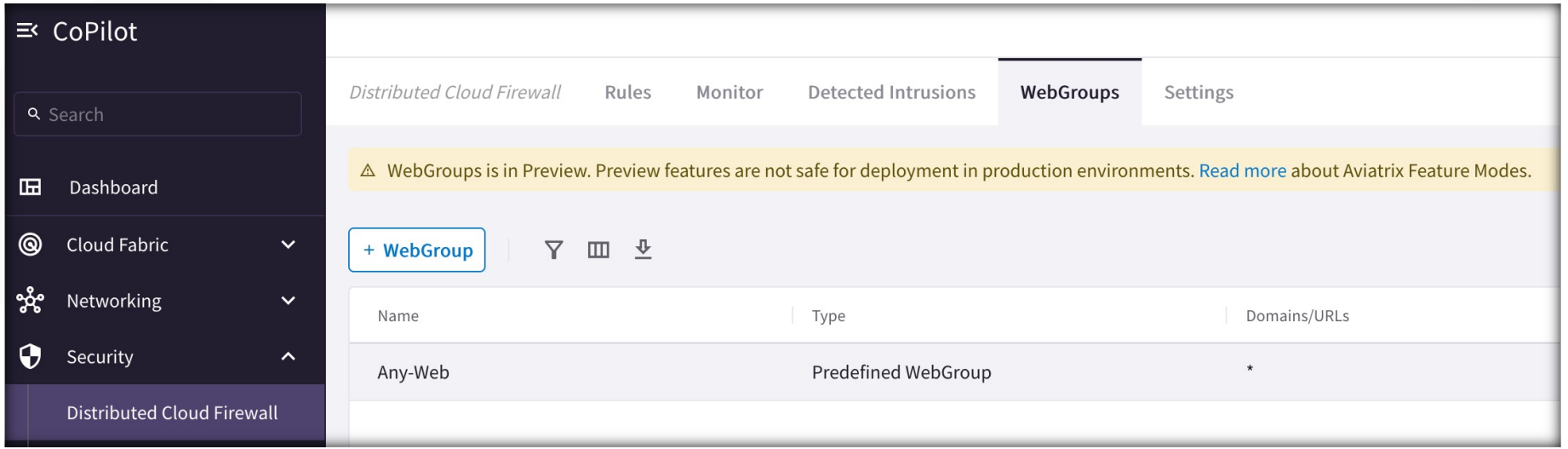




Timestamp	Source IP	VPC/VNet	Domain	Port	Rule Match	Action
Dec 6, 2023 10:40 AM	10.0.1.10	aws-us-east-2-spoke1	esm.ubuntu.com	443	Matched	Allowed
Dec 6, 2023 10:40 AM	10.0.1.10	aws-us-east-2-spoke1	security.ubuntu.com	80	Matched	Allowed
Dec 6, 2023 10:40 AM	10.0.1.10	aws-us-east-2-spoke1	us-east-2.ec2.archive.ubuntu.com	80	Matched	Allowed
Dec 6, 2023 10:40 AM	10.0.1.10	aws-us-east-2-spoke1	us-east-2.ec2.archive.ubuntu.com	80	Matched	Allowed
Dec 6, 2023 10:40 AM	10.0.1.10	aws-us-east-2-spoke1	us-east-2.ec2.archive.ubuntu.com	80	Matched	Allowed
Dec 6, 2023 10:39 AM	10.0.1.10	aws-us-east-2-spoke1	www.football.com	80	Matched	Allowed
Dec 6, 2023 10:39 AM	10.0.1.10	aws-us-east-2-spoke1	www.espn.com	80	Matched	Allowed
Dec 6, 2023 10:39 AM	10.0.1.10	aws-us-east-2-spoke1	www.wikipedia.com	80	Matched	Allowed
Dec 6, 2023 10:39 AM	10.0.1.10	aws-us-east-2-spoke1	www.aviatrix.com	80	Matched	Allowed

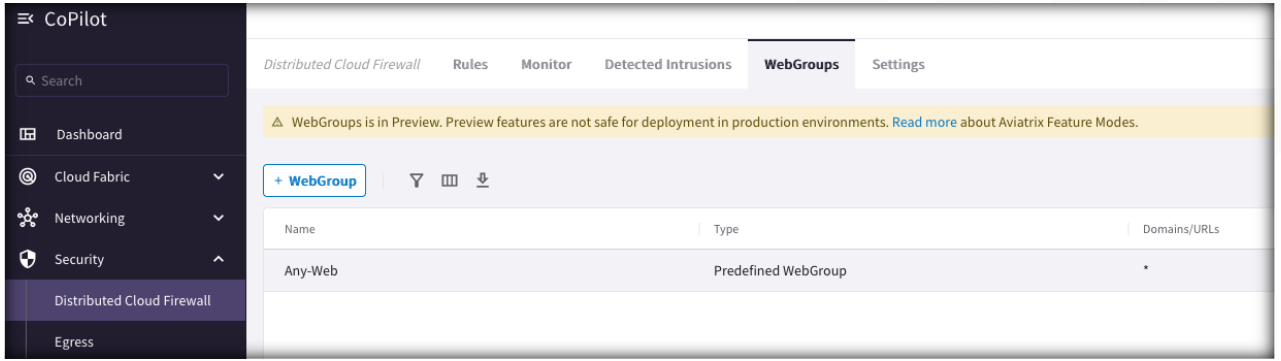
Predefined WebGroup: Any-Web

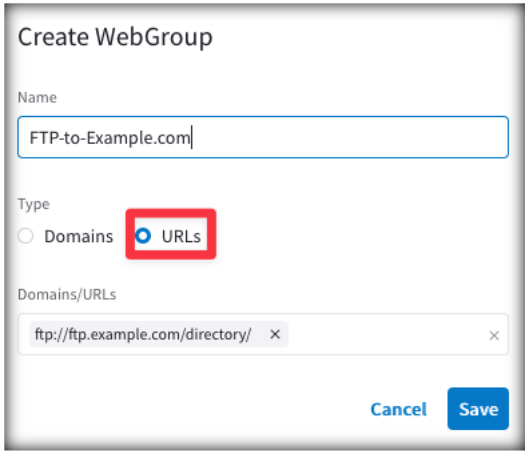
- When you navigate to **Security > Distributed Cloud Firewall > WebGroups**, a predefined WebGroup, *Any-Web*, has already been created for you.Edit the Greenfield-Rule:
  - This is an "allow-all" WebGroup that you must select in a Distributed Cloud Firewall rule if you do not want to limit the Internet-bound traffic for that rule, but you still want to log the FQDNs that are being accessed.

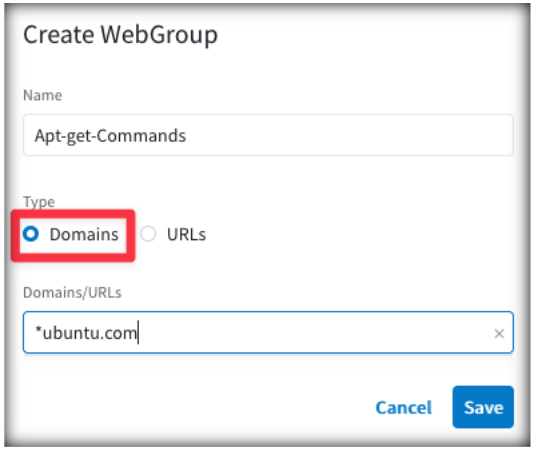


WebGroup Creation

- **WebGroups** are groupings of domains and URLs, inserted into Distributed Cloud Firewall rules, that filter (and provide security to) Internet-bound traffic.
- When you navigate to **Security > Distributed Cloud Firewall > WebGroups**, a predefined WebGroup, *Any-Web*, has already been created for you,
- URL: for anything else than HTTP/HTTPS
- Domains: for HTTP and HTTPs traffic

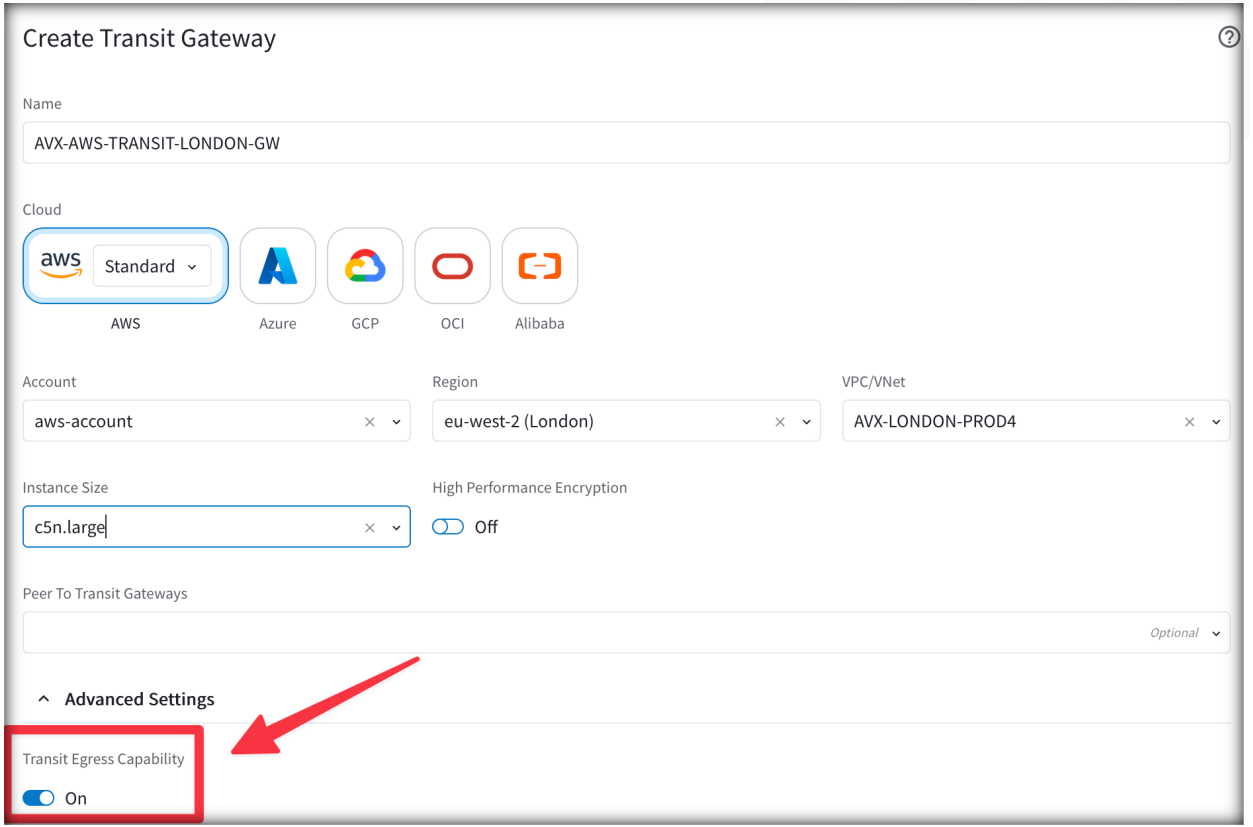






Transit Egress Capability

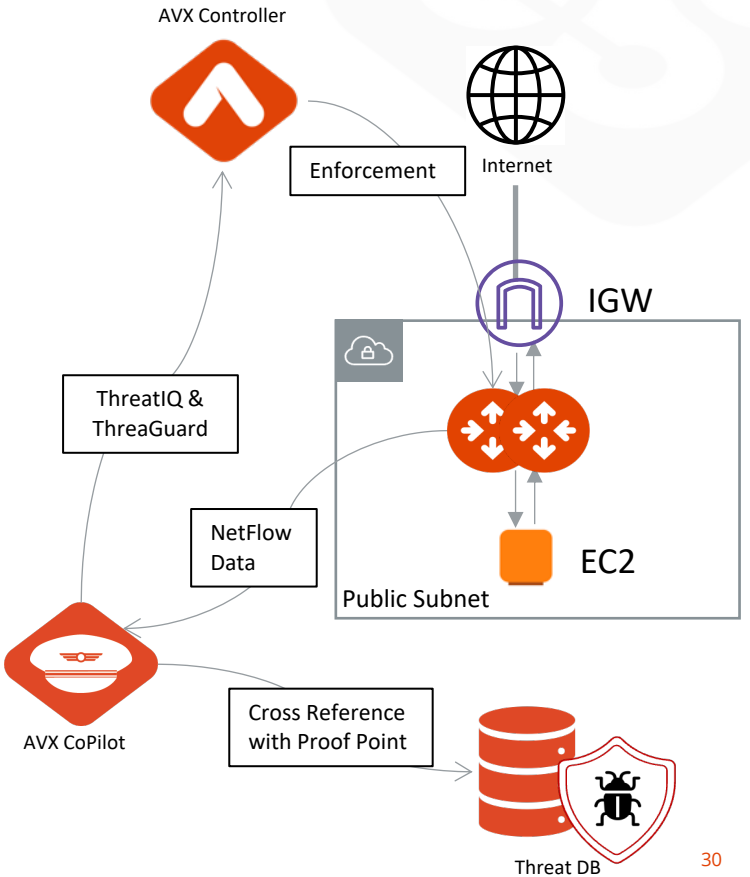
- To add *Transit Egress Capability* to a Transit Gateway, set the corresponding toggle to **On**.
- Gateways that turn On Transit Egress Capability are now ready to have attachments added (FireNet or Transit Egress).
- For Azure and GCP, selecting **Transit Egress Capability** must occur when the gateway is created. Otherwise, it will not display as an available Transit Gateway when adding FireNet or Transit Egress to a Transit Gateway.
- CAVEAT: all clouds except OCI and Alibaba.



Aviatrix PSF GW(aka Public Subnet Filtering Gateway)

Aviatrix PSF

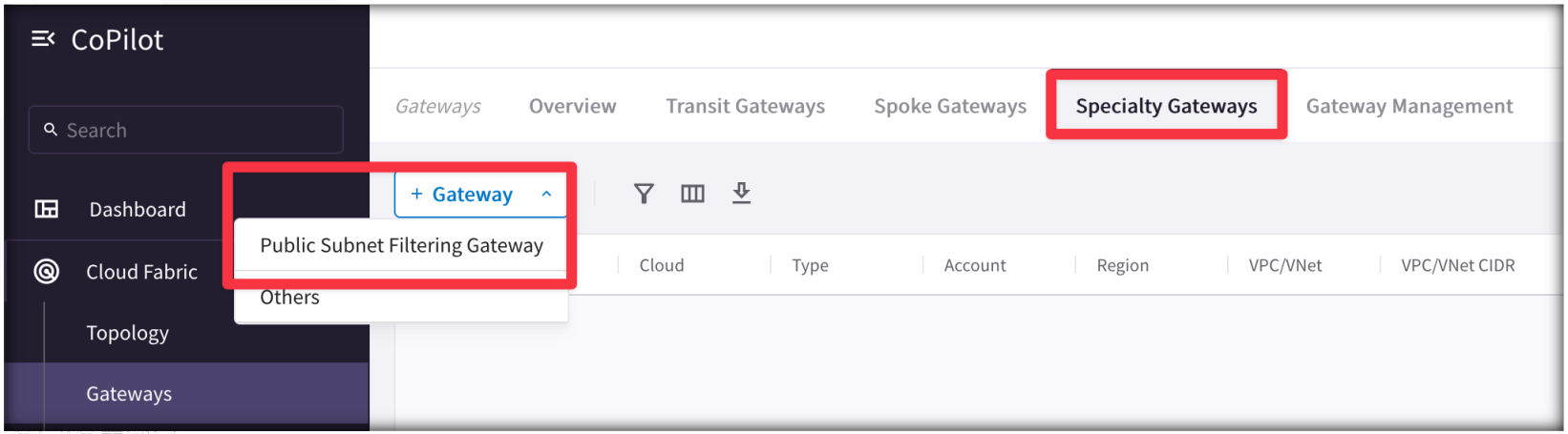
- Public Subnet Filtering Gateways (PSF gateways) provide ingress and egress security for **AWS** public subnets where instances have public IP addresses.
- After the Public Subnet Filtering (PSF) gateway is launched, view or block malicious IPs by activating **ThreatIQ**.
- The PSF gateway generates Netflow data, which is fed to FlowIQ.
- ThreatIQ monitors FlowIQ for any matches, and then alerts or programs a block (i.e. **ThreatGuard**) on the corresponding gateway.



Aviatrix PSF Deployment Workflow (part.1)

To deploy a Public Subnet Filtering Gateway:

1. In CoPilot, navigate to **Cloud Fabric** > **Gateways** > **Speciality Gateways** tab.
2. Click **+Gateway** and select **Public Subnet Filtering Gateway**.

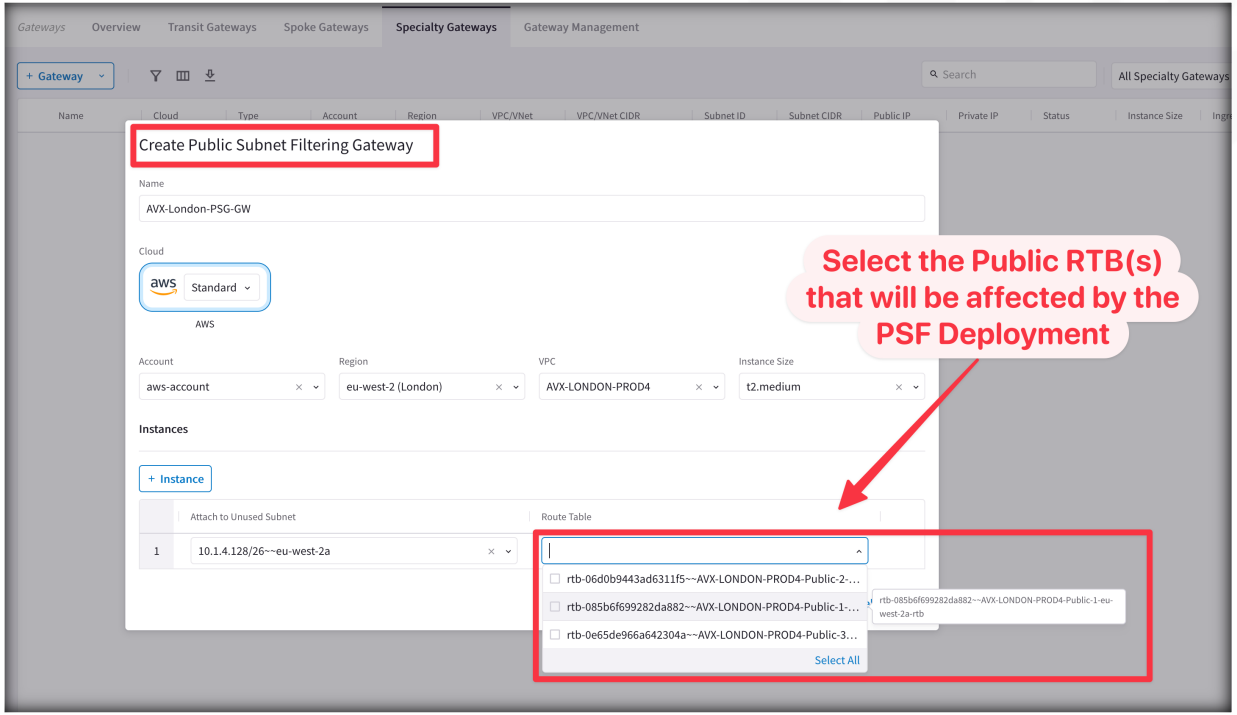


Aviatrix PSF Deployment Workflow (part.2)

3. Fill up the relevant fields with the required parameters.

4. Select the Public RTB that will get its default route affected (i.e. pointing to the PSF, instead of the IGW)

After the Public Subnet Filtering Gateway is deployed, **Ingress traffic** from IGW is routed to the gateway in a pass through manner. **Egress traffic** from instances in the protected public subnets is routed to the gateway in a pass through manner.



Lab 6 – Egress