Security

ACE Solutions Architecture Team

Agenda

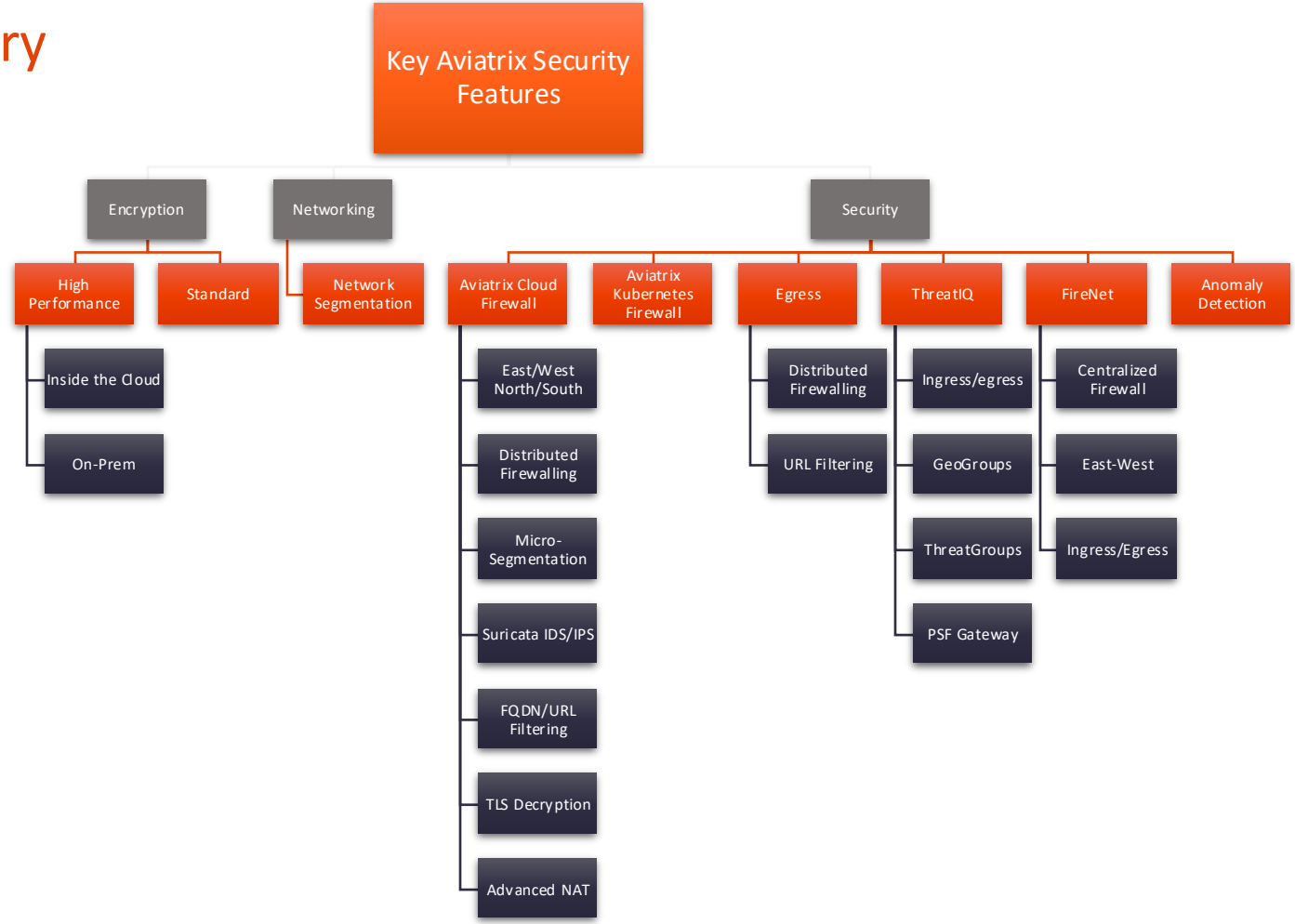
- Aviatrix Security Features Overview
- Securing Aviatrix Platform
- Aviatrix Cloud Firewall
- Public Subnet Filtering Gateway

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

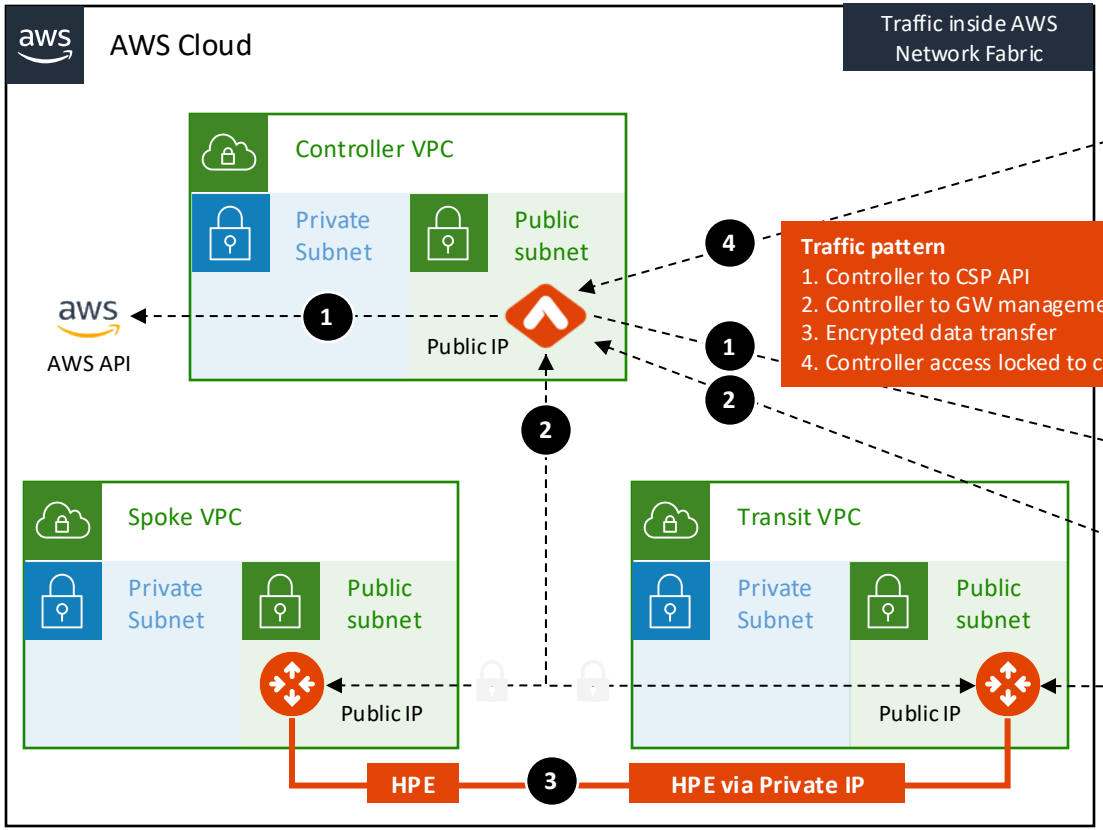
https://aviatrix.com/resources/ebooks/security-architects-guide-multi-cloud-networking-v2

Summary


Key Aviatrix Security Features
Encryption
Networking
Security
High Performance
Standard
Network Segmentation
Aviatrix Cloud Firewall
Aviatrix Kubernetes Firewall
Egress
ThreatIQ
FireNet
Anomaly Detection
Inside the Cloud
On-Prem
East/West North/South
Distributed Firewalling
Micro-Segmentation
Suricata IDS/IPS
FQDN/URL Filtering
TLS Decryption
Advanced NAT
Distributed Firewalling
URL Filtering
Ingress/egress
GeoGroups
ThreatGroups
PSF Gateway
Centralized Firewall
East-West
Ingress/Egress

Built-in Security of the Aviatrix Platform

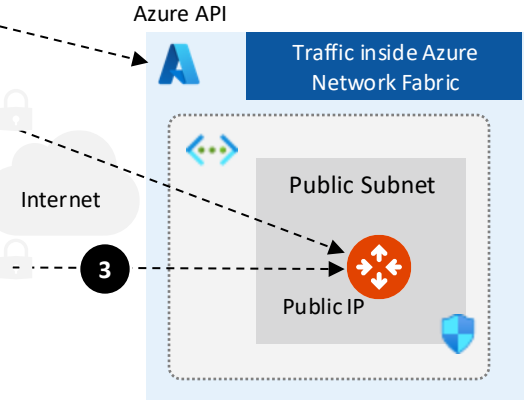
Secure Aviatrix Infrastructure Deployment | Example in AWS & Azure

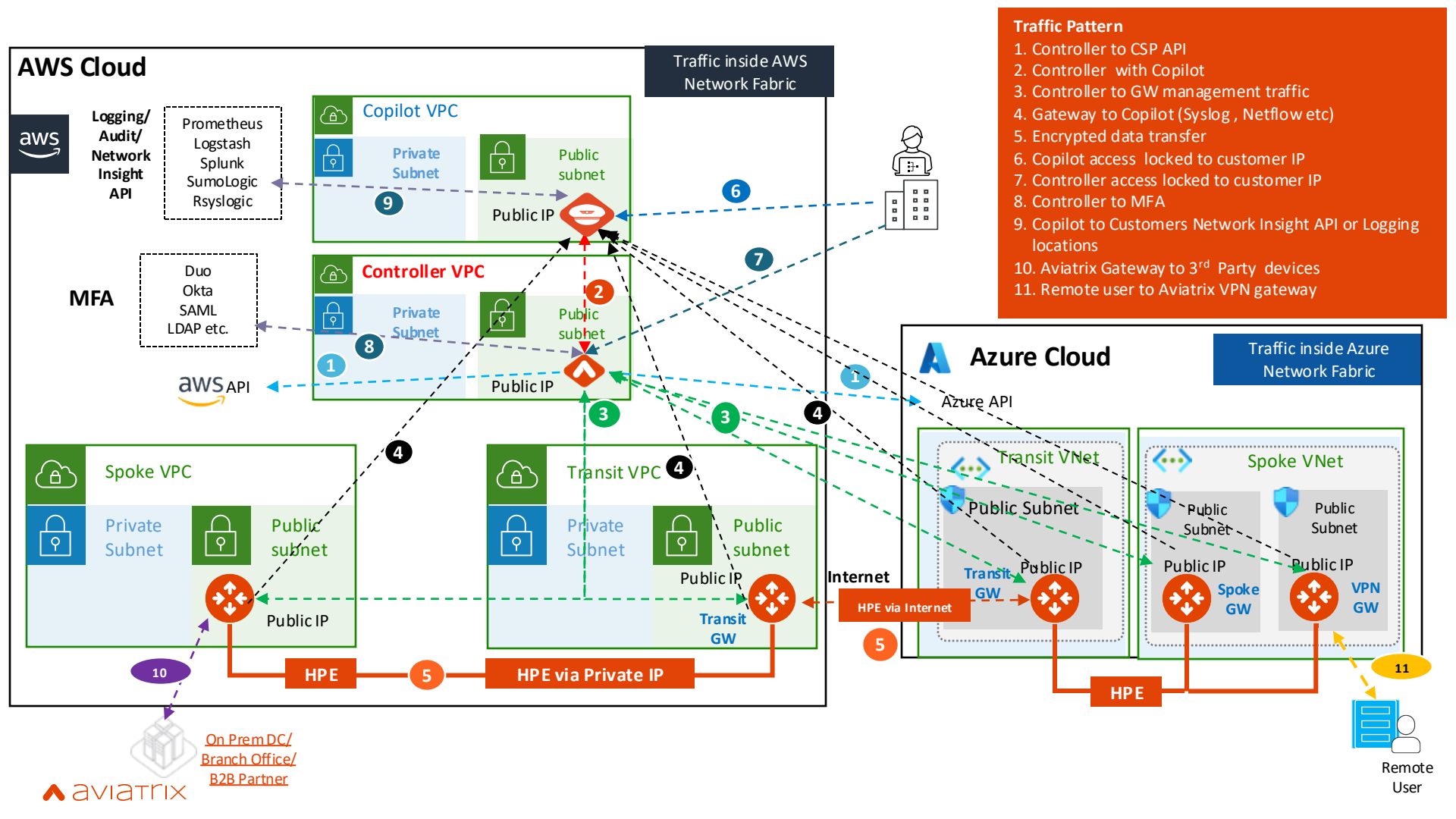


Traffic pattern
1. Controller to CSP API
2. Controller to GW management traffic
3. Encrypted data transfer
4. Controller access locked to customer IP

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

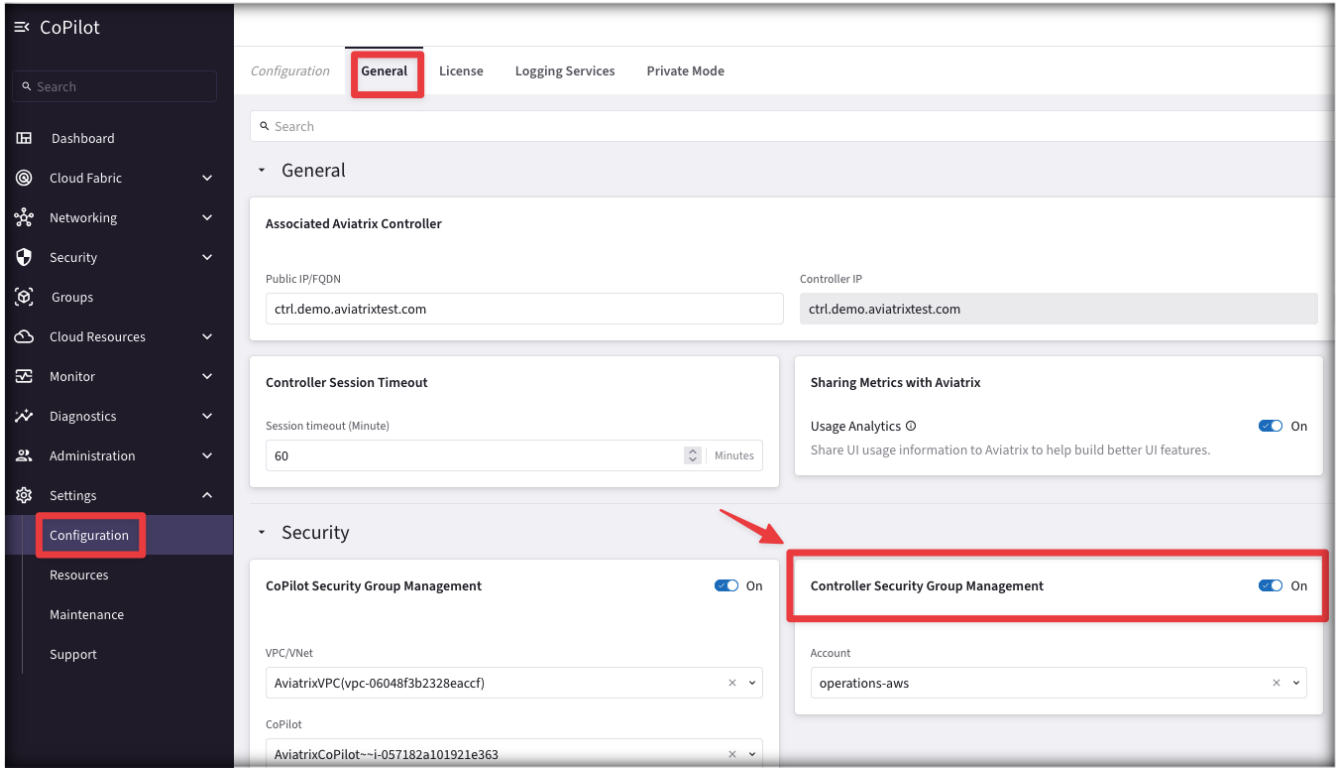



AWS Cloud
Traffic inside AWS Network Fabric
Logging/ Audit/ Network Insight API
Prometheus
Logstash
Splunk
SumoLogic
Rsyslogic
Copilot VPC
Private Subnet
Public subnet
Public IP
MFA
Duo
Okta
SAML
LDAP etc.
Controller VPC
aws API
Spoke VPC
Transit VPC
HPE
HPE via Private IP
Internet
HPE via Internet
Azure Cloud
Traffic inside Azure Network Fabric
Azure API
Transit VNet
Public Subnet
Transit GW
Spoke VNet
Spoke GW
VPN GW
On Prem DC/ Branch Office/ B2B Partner
Remote User
aviatrix
Traffic Pattern
1. Controller to CSP API
2. Controller with Copilot
3. Controller to GW management traffic
4. Gateway to Copilot (Syslog , Netflow etc)
5. Encrypted data transfer
6. Copilot access locked to customer IP
7. Controller access locked to customer IP
8. Controller to MFA
9. Copilot to Customers Network Insight API or Logging locations
10. Aviatrix Gateway to 3rd Party devices
11. Remote user to Aviatrix VPN gateway

Controller Security Group Management (part.1)

- You can use the **Controller Security Group Management** feature to automatically manage the Controller instance's inbound rules from gateways.
- When enabled (**default**), each time you deploy an Aviatrix gateway, a rule will be automatically added to the Controller instance's inbound rule to allow the gateway to reach the Controller. Only TCP port 443 needs to be opened for inbound traffic to the Controller. Gateways launched from the Controller use its public IP address to communicate back to the Controller.
- After the Controller Security Group Management feature is enabled, you can edit the security rules that are outside gateways public IP addresses to limit the source address range. When specifying the custom IP addresses to allow access, you must include your own public IP address.

Controller Security Group Management (part.2)



- You can enable Controller Security Group Management in CoPilot from **Settings > Configuration > General**

CoPilot Security Group Management (part.1)

- When **CoPilot Security Group Management** is enabled (**default**), the Controller creates a security group for the specified CoPilot virtual machine to manage its inbound security-group rules.

The feature adds gateway IP rules to customer-attached CoPilot security groups as well as CoPilot-created security groups. CoPilot comes with a base security group when it is first launched.

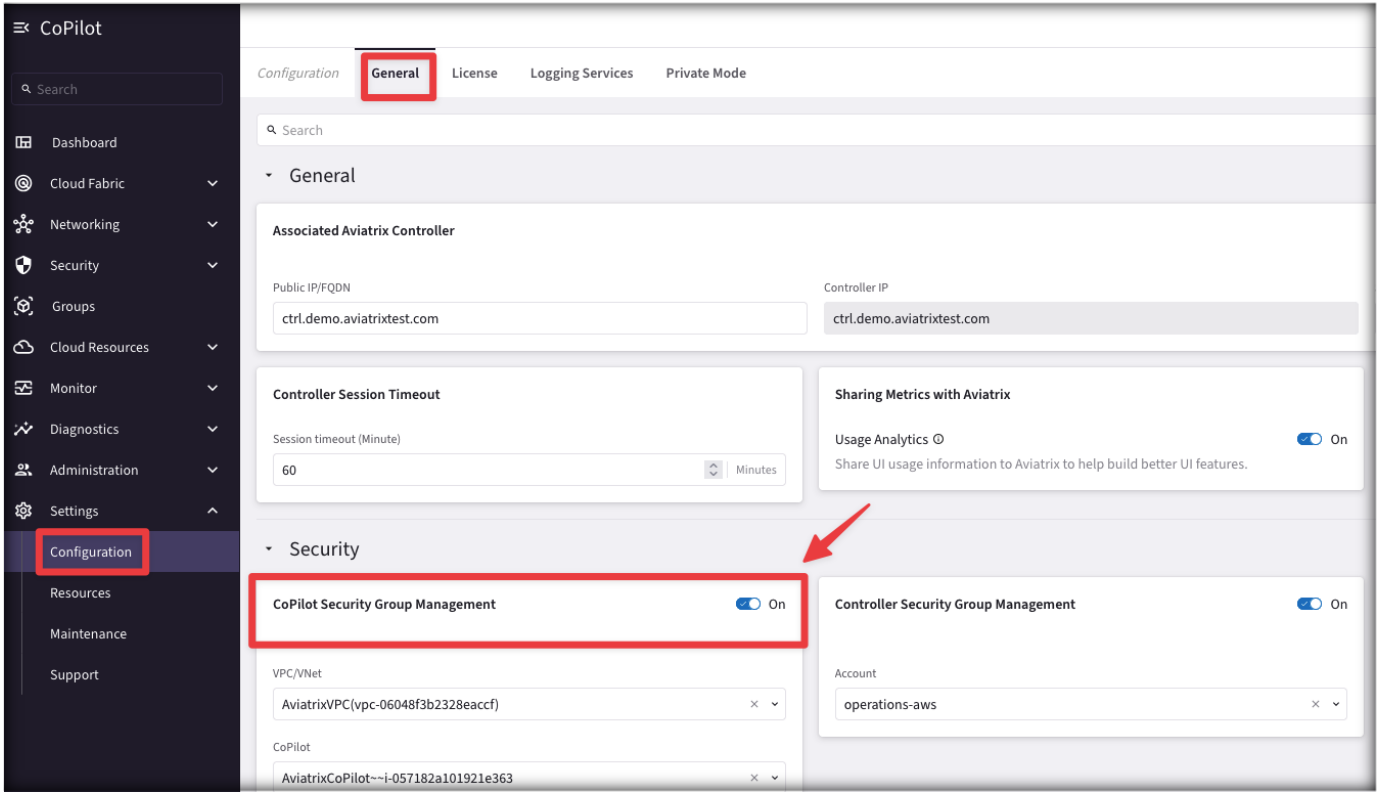
The Controller adds rules to the security group for each gateway IP for the following:

- ***UDP port 5000*** (default) — Enable Syslog for CoPilot Egress FQDN (Legacy) & Audit Data (from each gateway). Gateways send remote syslog data to CoPilot.
- **TCP port 5000** (default, if using Private Mode) — Enable Syslog for CoPilot Egress FQDN & Audit Data (from each gateway). Gateways send remote syslog data to CoPilot.
- **UDP port 31283** (default, port is configurable) — Enable NetFlow for CoPilot FlowIQ Data (from each gateway). Gateways send NetFlow to CoPilot.

The Controller adds the above rules for:

- New gateways launched from the Controller after the feature is enabled.
- Existing gateways launched from the Controller before the feature was enabled.

CoPilot Security Group Management (part.2)



- You can enable CoPilot Security Group Management in CoPilot from **Settings > Configuration > General**

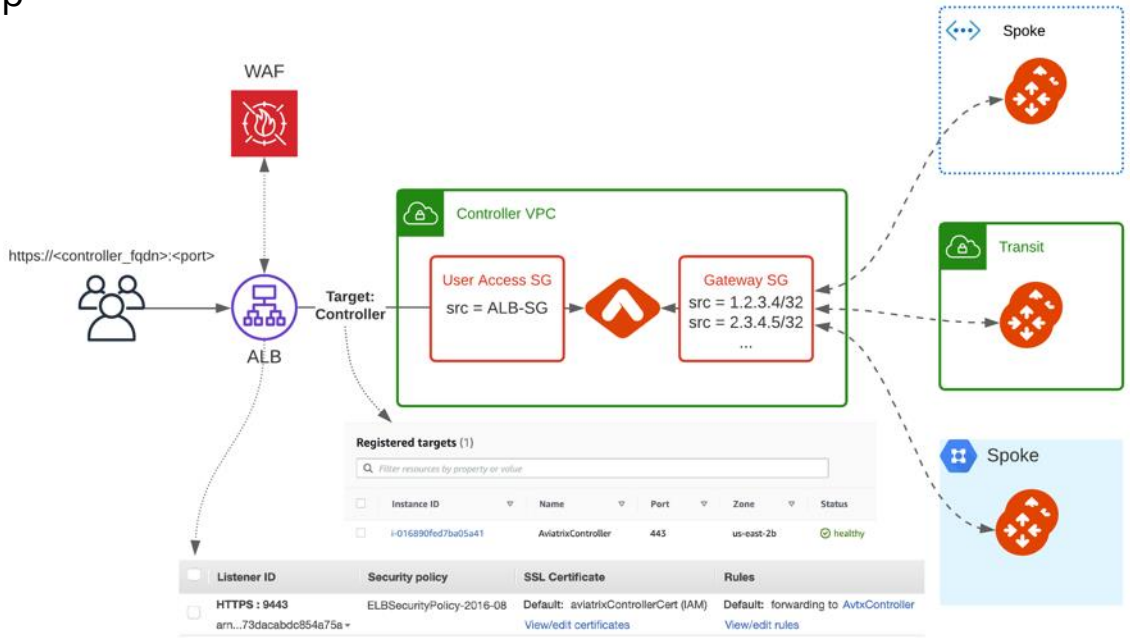
Securing the Platform with Cloud Native Load Balancers

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

AWS

- Verify that the Controller Security Group Management feature is NOT disabled. This feature allows access to the Controller EIP from Aviatrix Gateways, solely
- 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



Aviatrix Cloud Firewall

Problem Statement

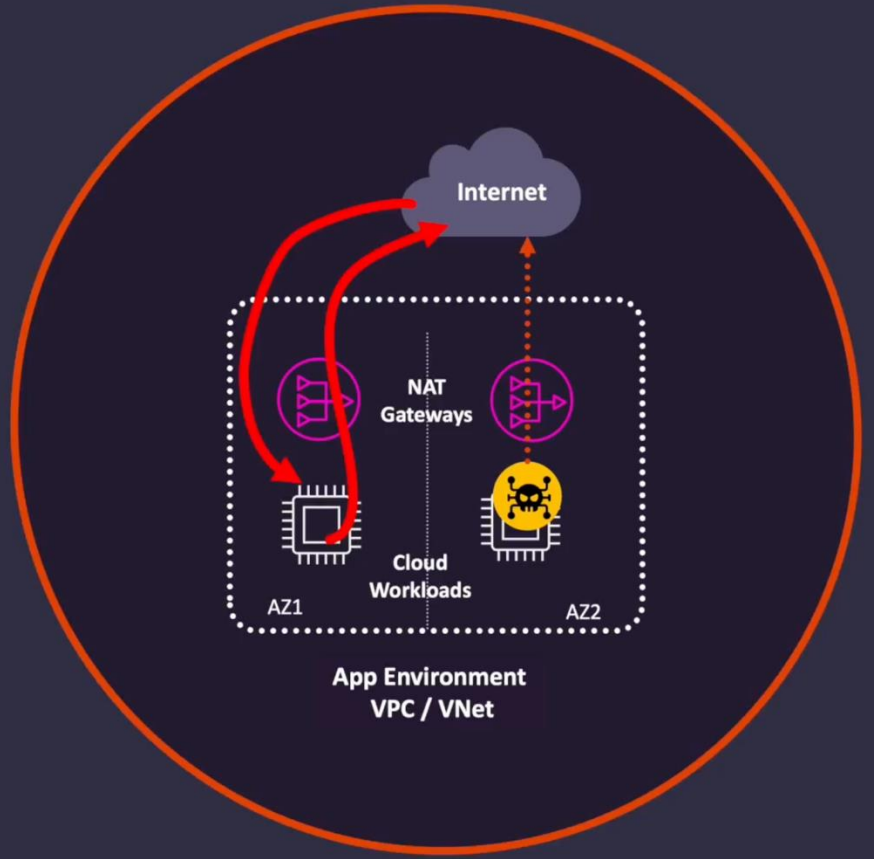
Private workloads need internet access

- **SaaS integration**
- **Patching**
- **Updates**

Understanding the Pain

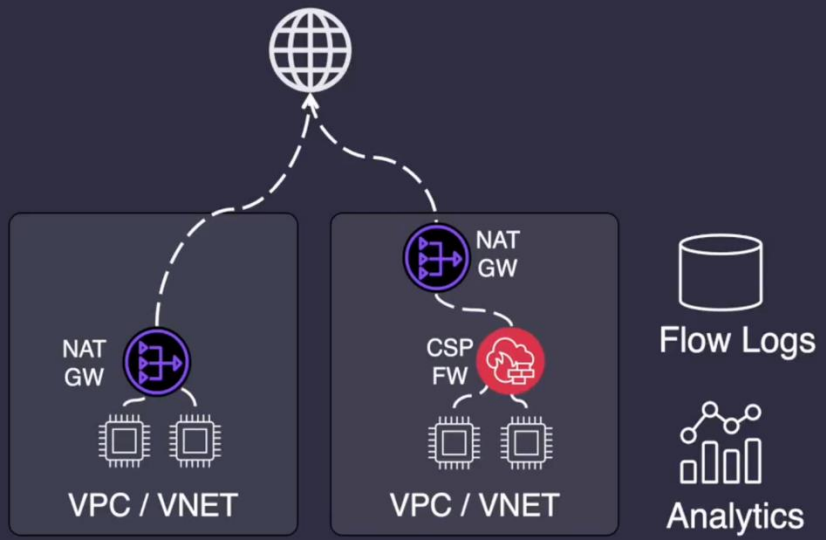
Improve Security and Lower Cloud Costs

- Business Pain
  - Excessive Cloud Costs
  - Lack of Compliance & Governance
  - Risk to Business-Critical Workloads
  - Regulatory Fines and Penalties
  - Brand Health and Customer Trust
- Technical Pain
  - No Policy Enforcement
  - Slow Troubleshooting and Forensics
  - Identifying Noisy Workloads
  - Support Distributed Deployments
  - Advanced Inspection Capabilities



aviatrix

Two Common Paths



1. Distributed Cloud Provider Services

- Expensive: High data-processing costs
- Zero / Weak Security
- Poor Visibility
  - Some visibility with a lot of tools
- Log storage and analytics costs
- No centralized intelligence
- Not multi-cloud capable

CLOUD SECURITY

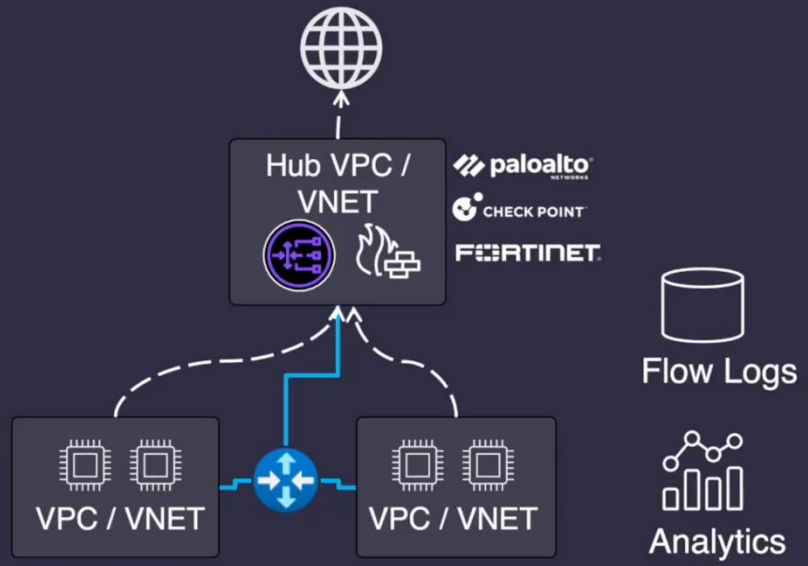
CyberRatings.org Announces Test Results for Cloud Service Provider Native Firewalls

Protection ranged from 0.38% to 50.57% for security effectiveness.

Two Common Paths

2. Central Virtualized Appliances

- Very Expensive
- Not built for cloud: operational complexity
- No support for Island VPCs / VNets
- Requires Overly Complex Routing Architecture
- Security Hub Connectivity dependent
- No centralized network and security intelligence
- Additional troubleshooting issues
- Not multi-cloud deployable



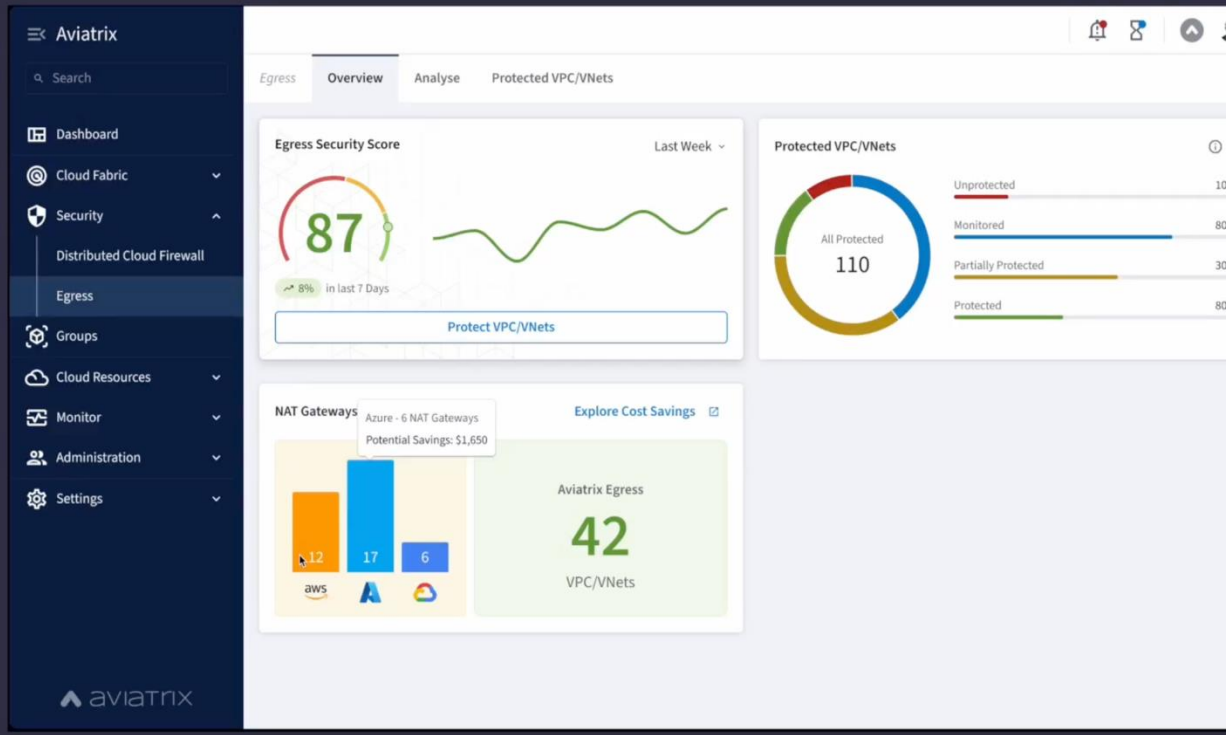
Aviatrix Cloud Firewall

What it is:

- Central Policy Management & Observability
- Distributed Enforcement: at the workload

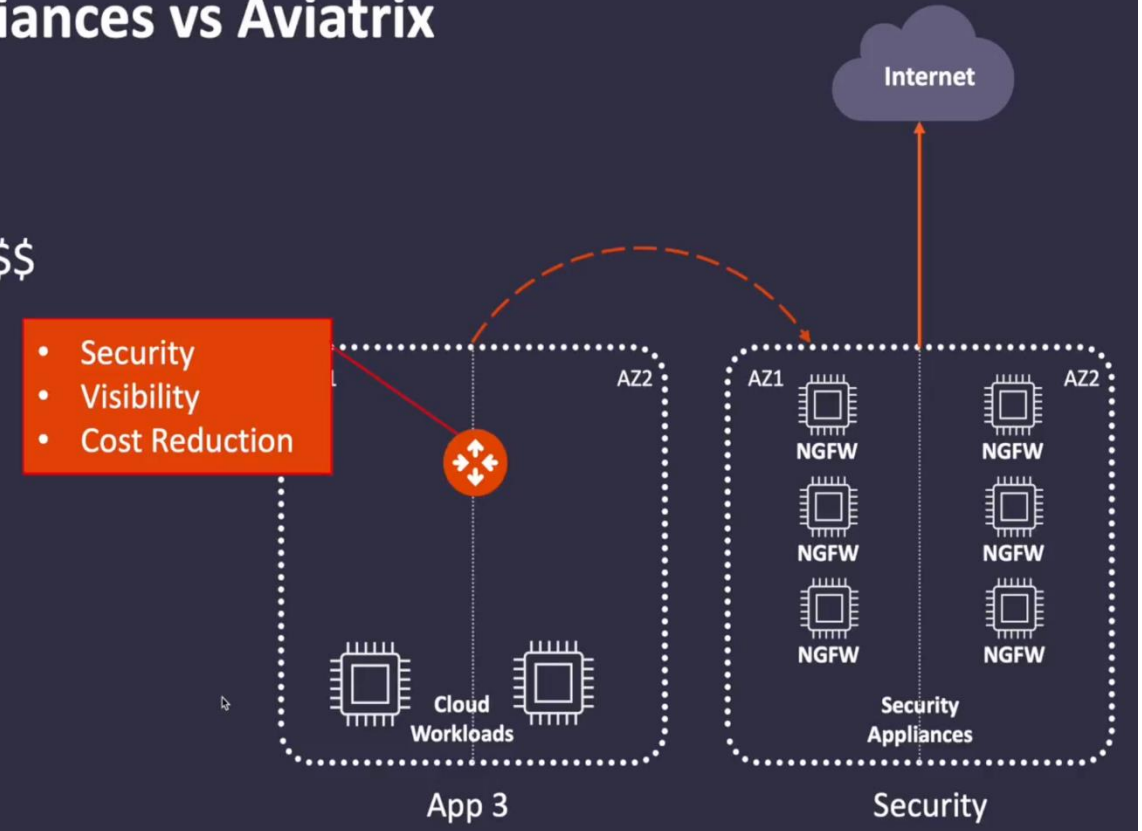
What you get:

- Secure Networking that's:
  - Agile,
  - Reduces Costs & Complexity
  - Increases Visibility



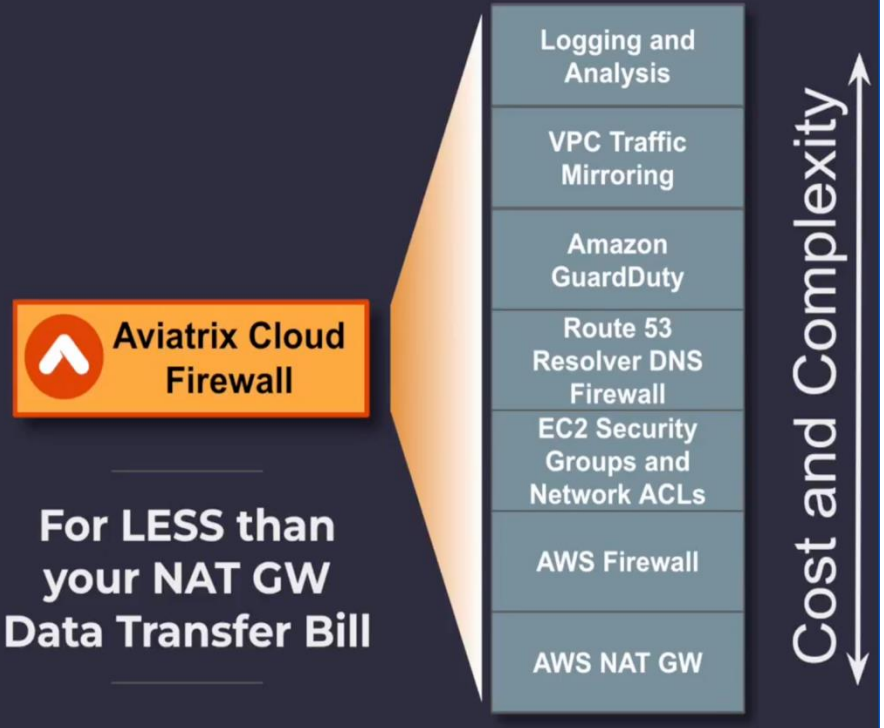
Central Virtualized Appliances vs Aviatrix

- Reduce Data Transfer Costs:
  - Enforcement at the Workload
- Reduced Data Transfer Costs $$$
- Reduced Route Complexity
- Reduced Operational Pain



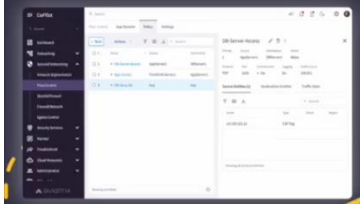
Distributed Cloud Provider Services vs Aviatrix

- Consolidation of Egress Security Stack
- Reduction in complexity
- Reduction in Data Transfer Costs $$$
- Reduction in Operational Pain



https://aviatrix.com/aviatrix-paas

Achieve 25% Cost Savings over 1st Party NAT GWs



Aviatrix PaaS

Internet

Centralized Management, Visibility, and Control

1:1 Replacement of NAT GW

AZ1 AZ2 AZ1 AZ2 AZ1 AZ2

Distributed Perimeter

Aviatrix Distributed Cloud Firewall Gateways

Aviatrix Distributed Cloud Firewall Gateways

Aviatrix Distributed Cloud Firewall Gateways

Cloud Workloads

Cloud Workloads

Cloud Workloads

Cloud Workloads

App 1

App 2

App 3

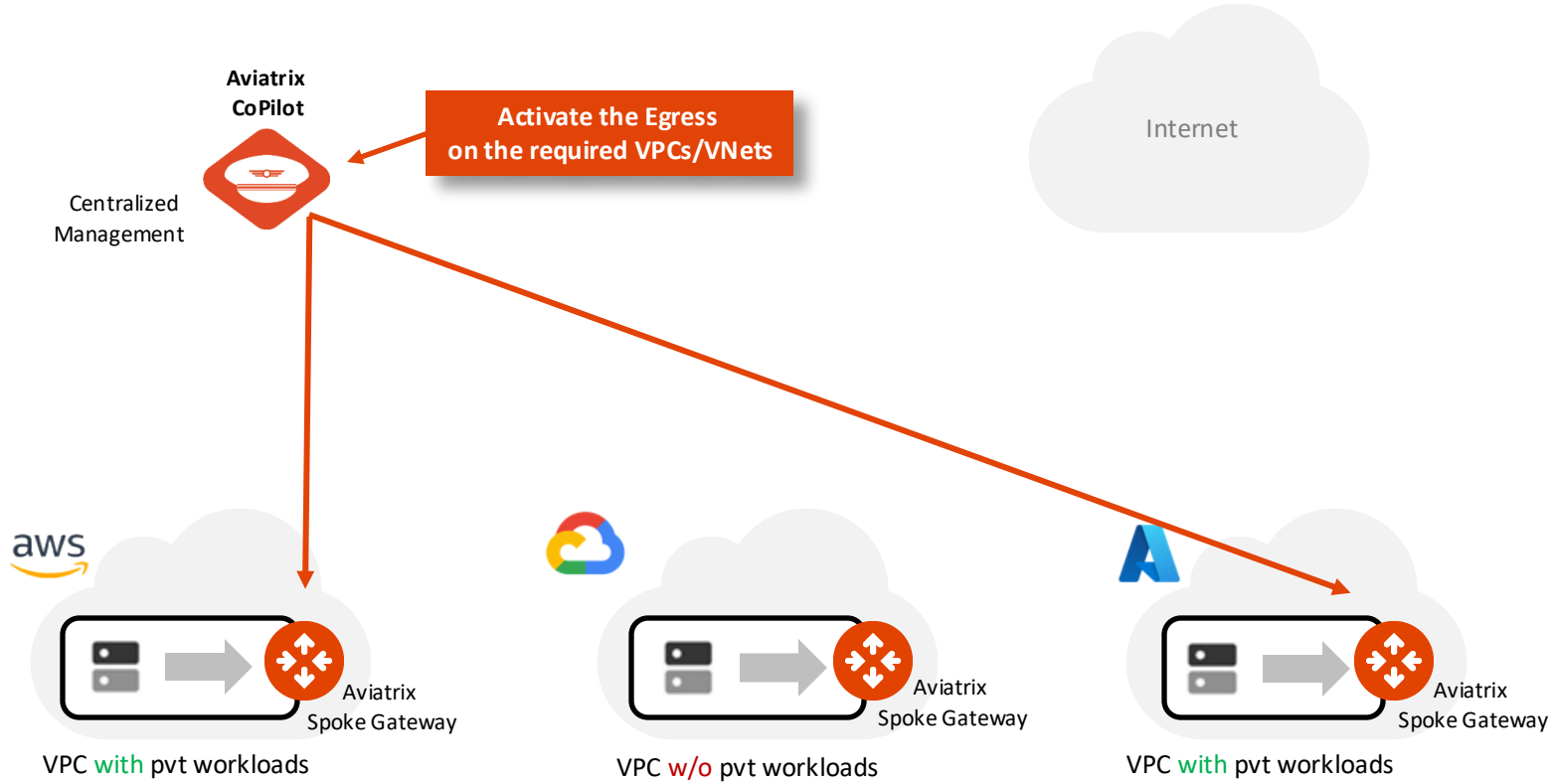
App 4

aws

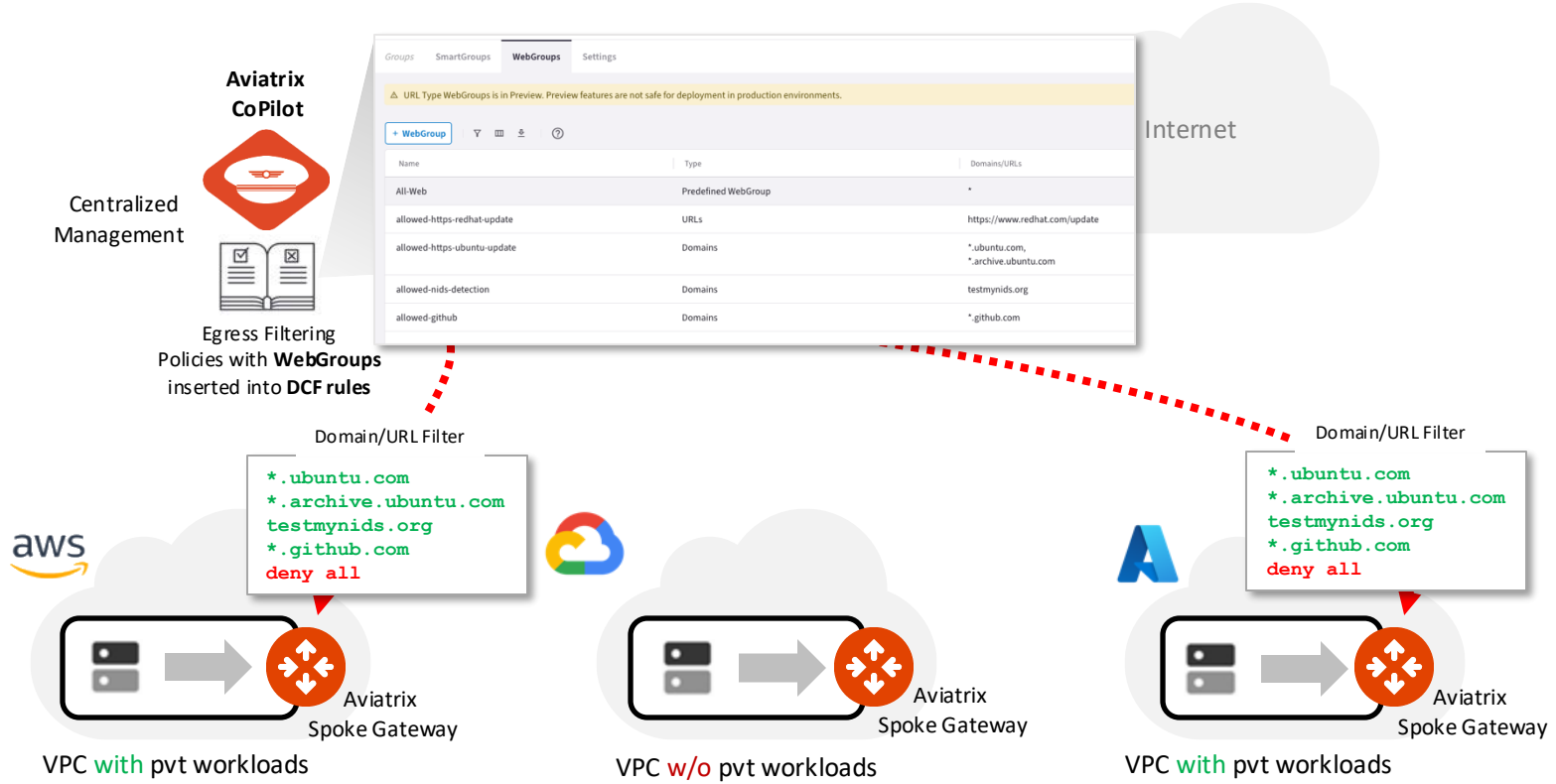
Azure

Google Cloud

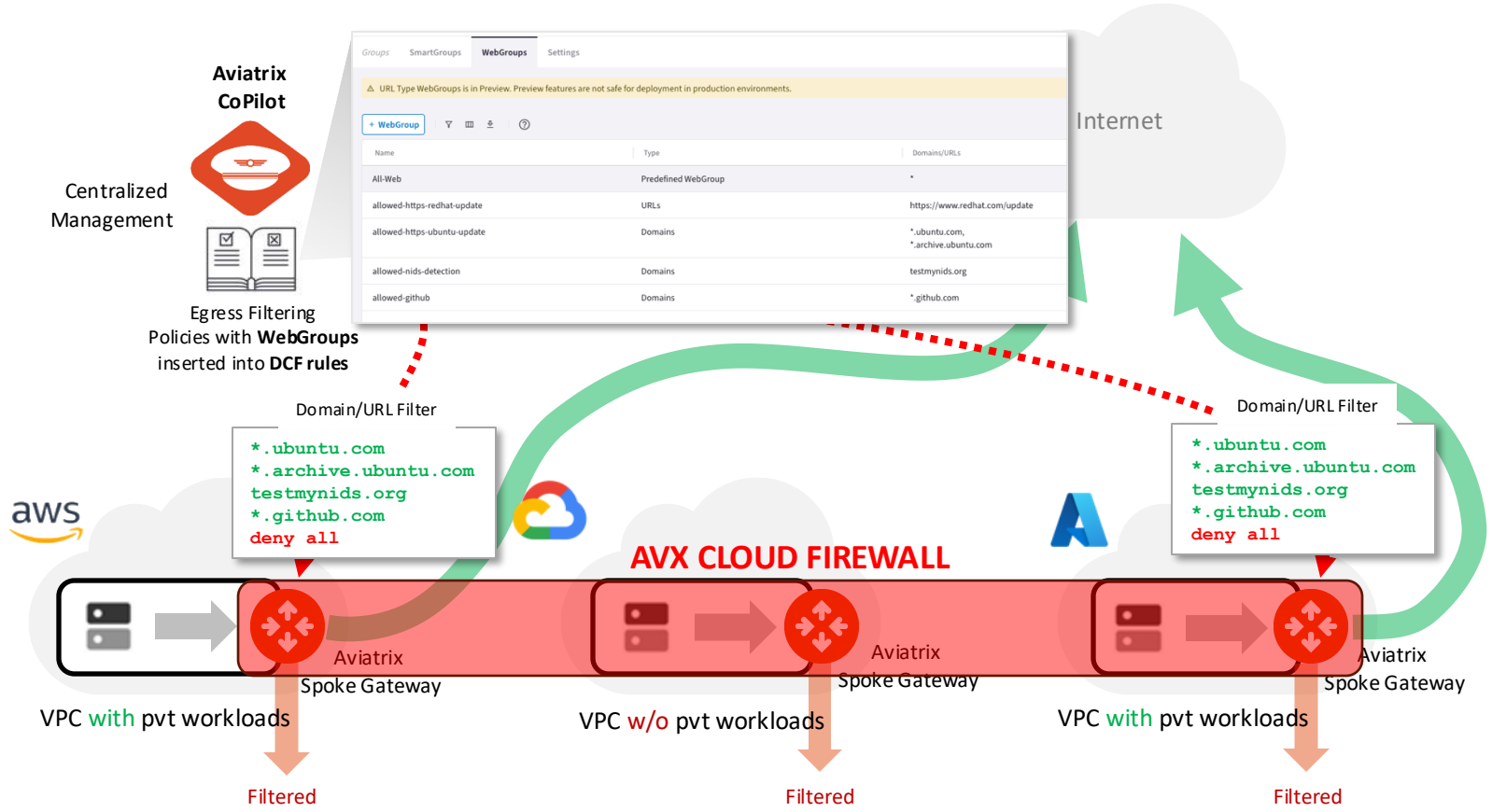
Aviatrix Cloud Firewall



Aviatrix Cloud Firewall



Aviatrix Cloud Firewall



- The Aviatrix Cloud Firewall can be extended also to the Edge

Problem Statement

Private workloads need internet access

- **SaaS integration**

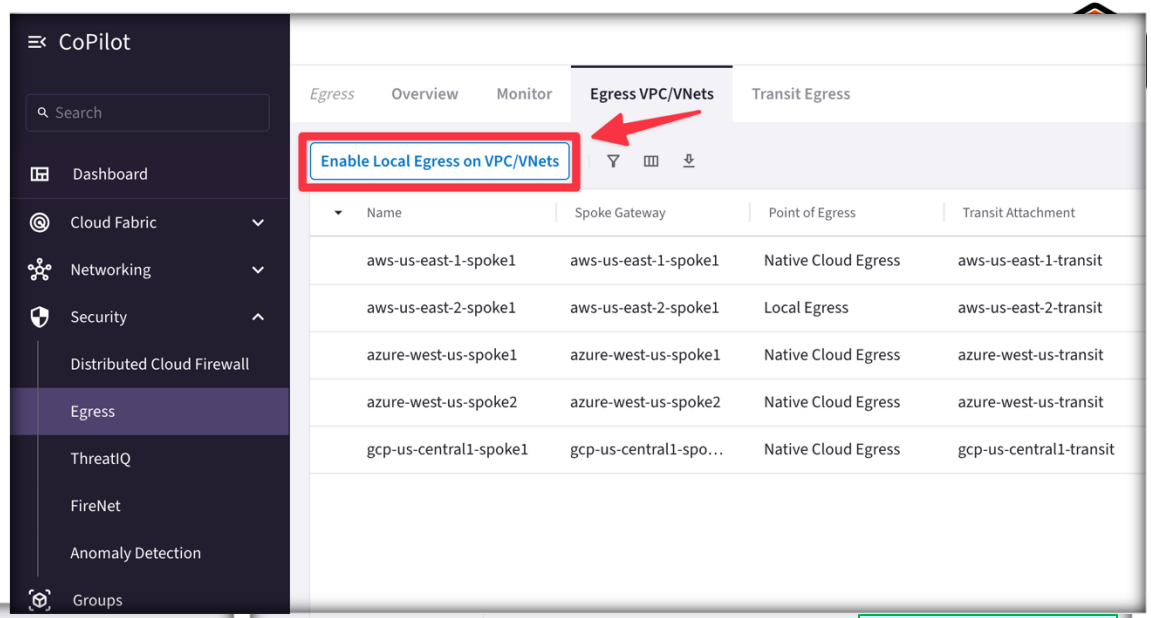
- **Patching**

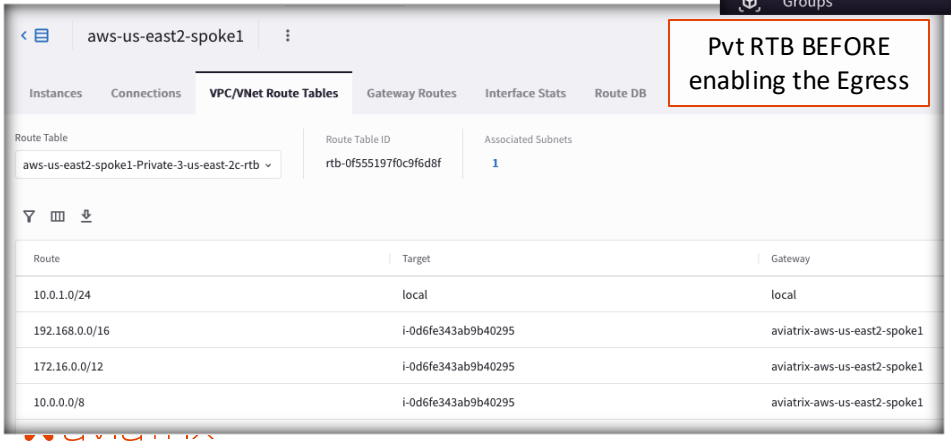
- **Updates**

Customer Priority	Protection Against Data Exfiltration Breaches			
Customer Needs	Cloud-fluent Policy / Security Posture	Agile Workload Observability		
Aviatrix Bundles (SKU)	Aviatrix Cloud Firewall (ACF)	Aviatrix K8s Firewall (AKF)		
Aviatrix Features	DCF	NAT	Security Score	PaaS

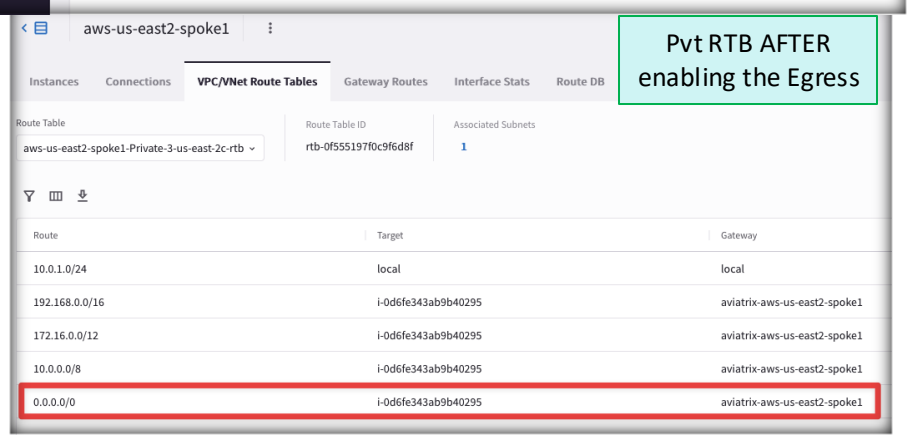
Enabling Egress

- 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.





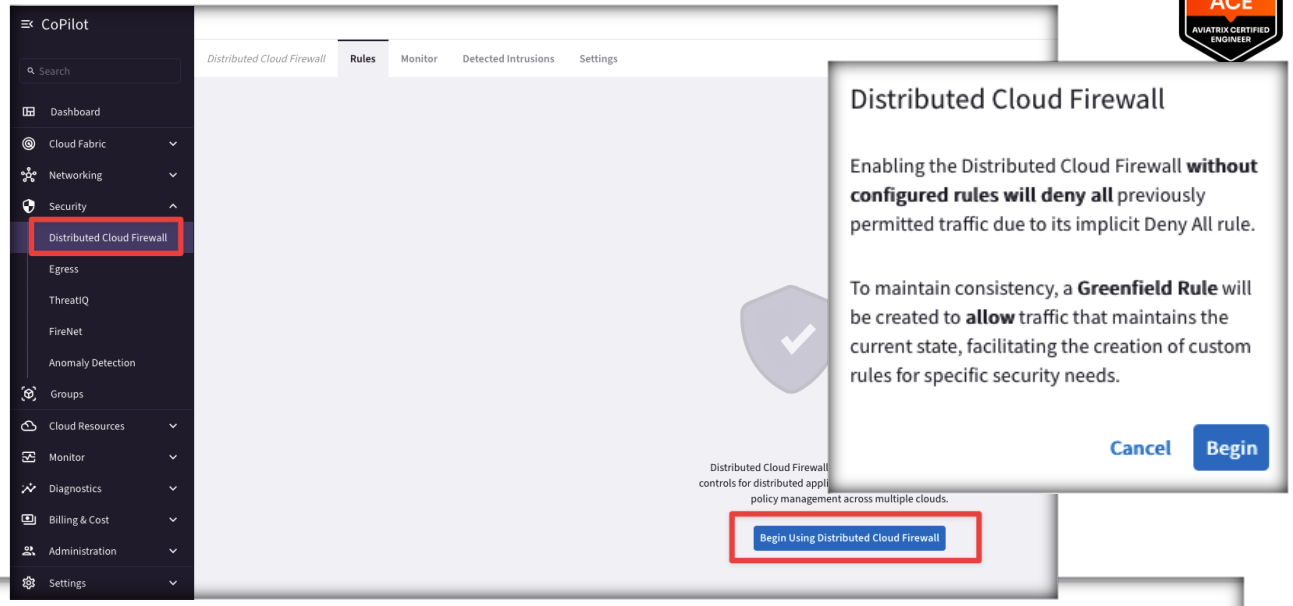
Pvt RTB BEFORE enabling the Egress

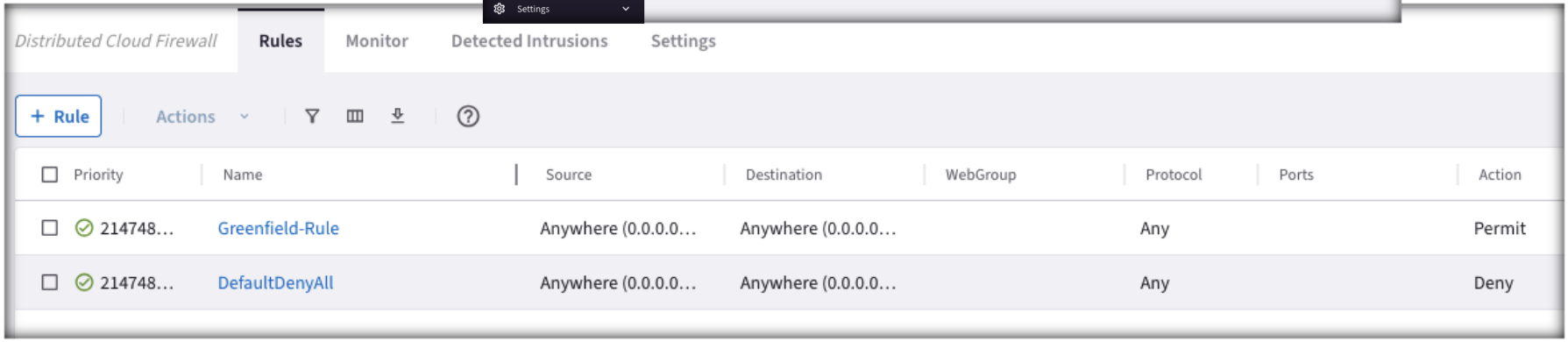


Pvt RTB AFTER enabling the Egress

The Greenfield-Rule

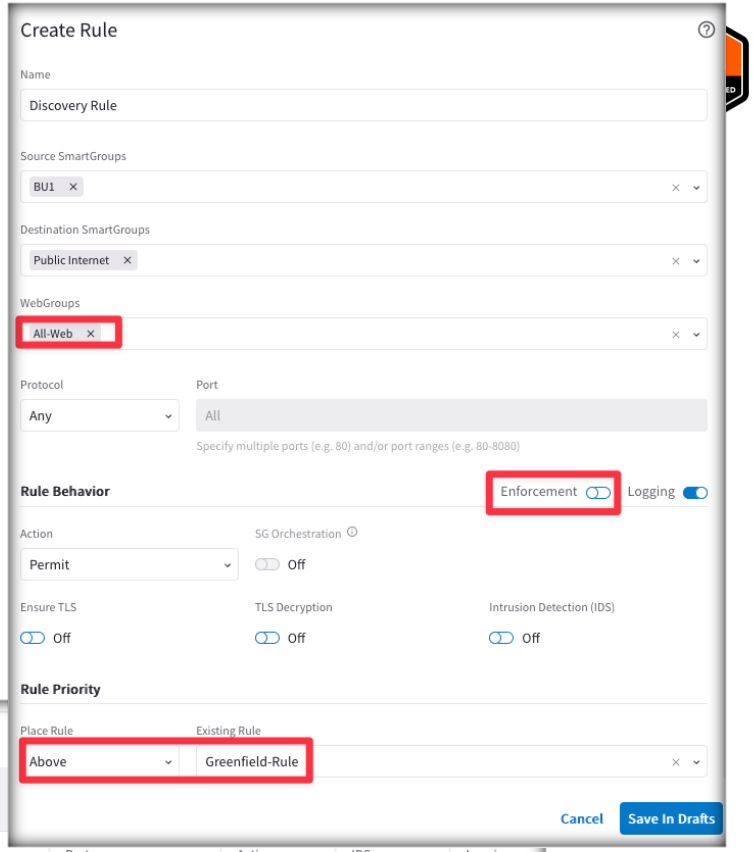
- If you want to apply policies on your Egress traffic, you must enable the Distributed Cloud Firewall.
- The Egress control requires the activation of the Distributed Cloud Firewall.
- The **Greenfield-Rule** is automatically added to allow all kind of traffic.
- An Explicit Deny Rule, named **DefaultDenyAll,** is also added below the Greenfield-Rule.
- *Caveat:* Logging is disabled by default on the Greenfield-Rule

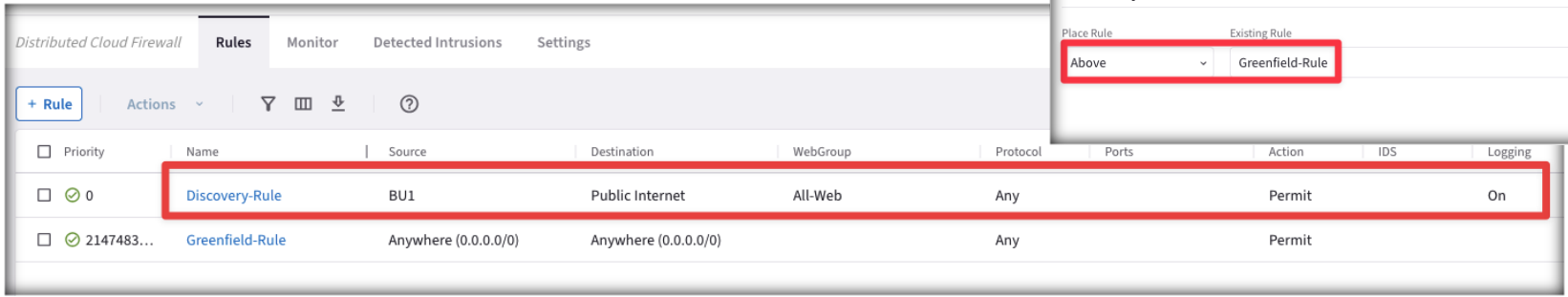




Discovery Process

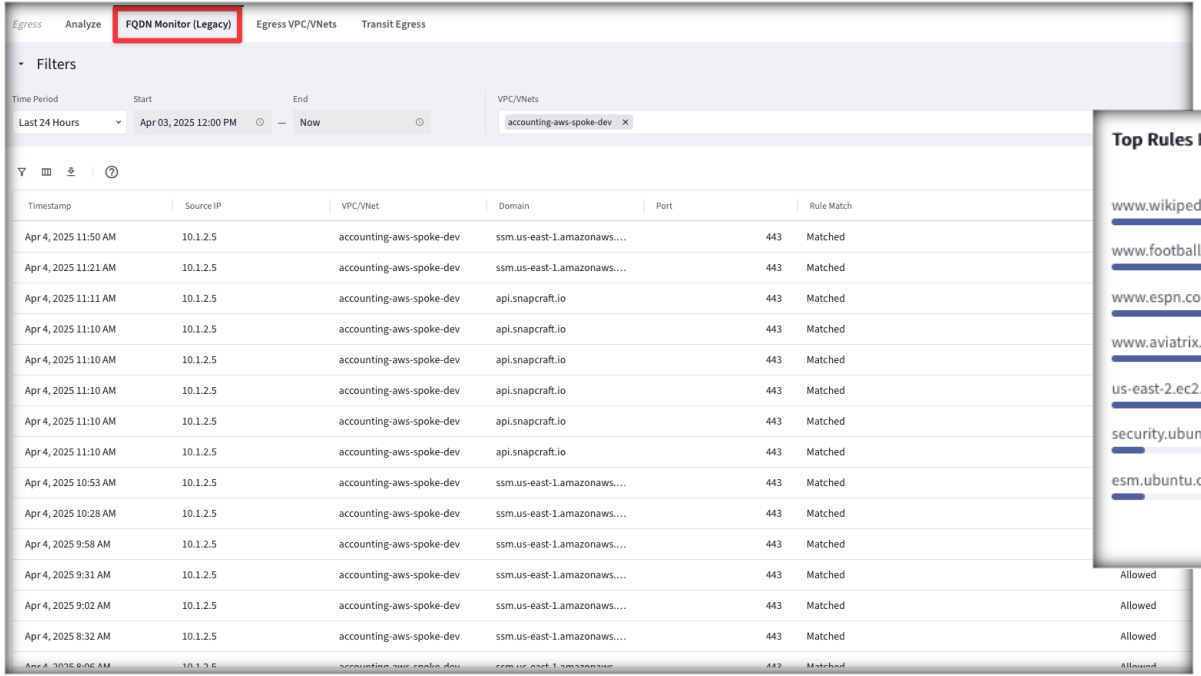
- If you are unsure about the sites your applications are accessing, you can temporarily enable an ad-hoc Discovery Rule.
    a) Attach the SmartGroup that identifies the private workloads affected by the Egress feature, previously enabled, as *Source SmartGroup*.
    b) Attach the Predefined SmartGroup **"Public Internet"**, as *Destination SmartGroup*.
    c) Attach the Predefined ***All-Web*** WebGroup.
    d) Turn On the ***"Logging"*** toggle
    e) Turn Off the ***"Enforcement"*** 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 displayed undfer the ***CoPIlot > Security > Egress > FQDN Monitor (Legacy)*** *tab*





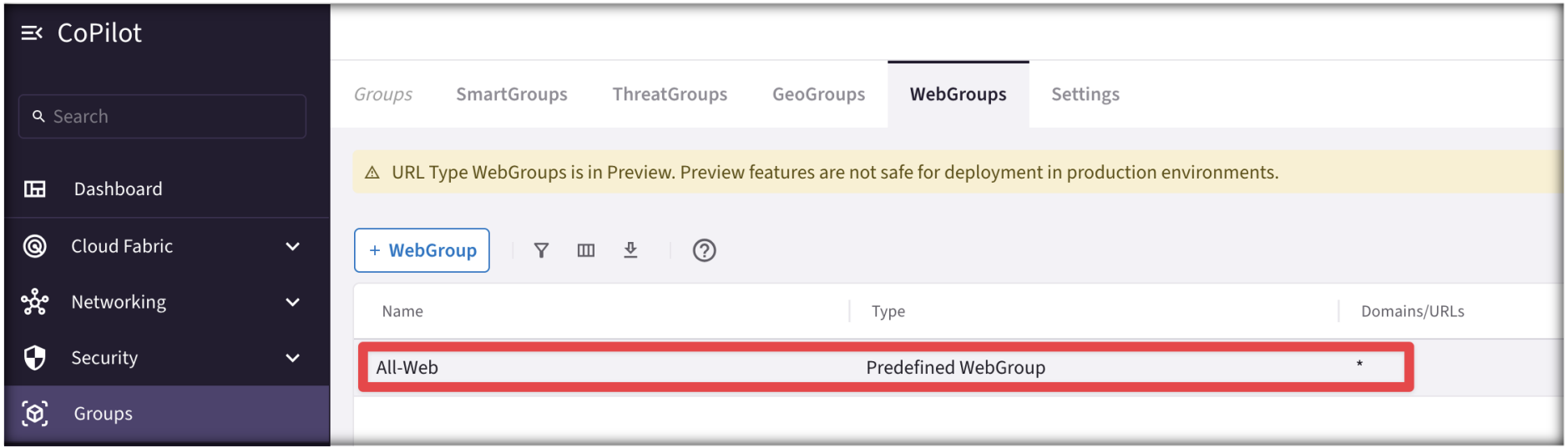
Monitor

- On the **FQDN Monitor (Legacy)** section you can retrieve all the logs and therefore distinguish the domains that should be permitted from those ones 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. ZTNA approach)*.



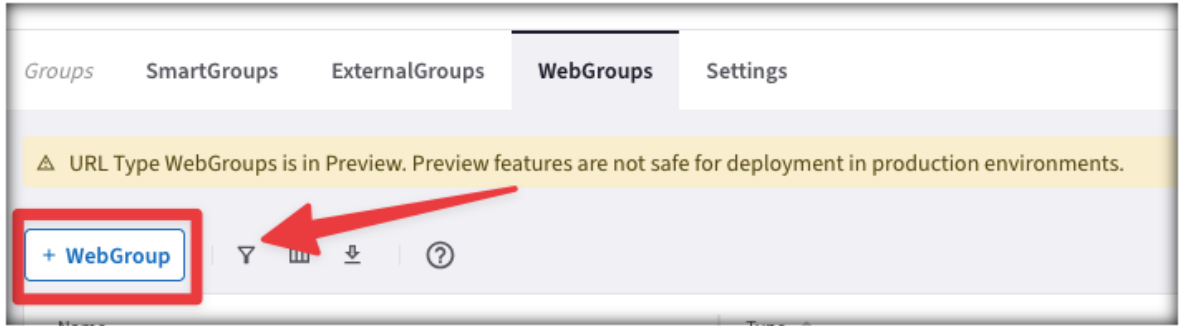
Predefined WebGroup: All-Web

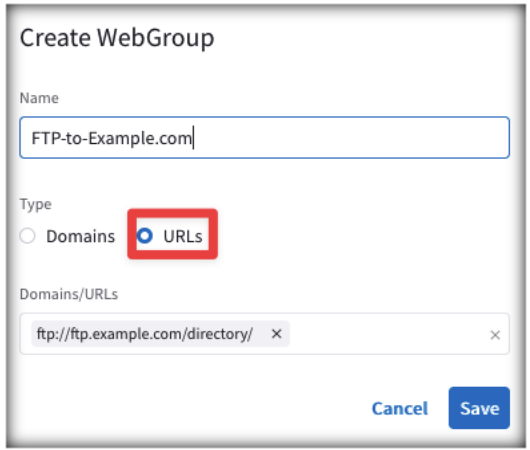
- When you navigate to **CoPilot > Groups**, a predefined WebGroup, *All-Web*, has already been created for you.
- This is an *"allow-all"* WebGroup that you must select in a Distributed Cloud Firewall rule if you do not want to limit the Internet-bound traffic for that rule, but you still want to log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

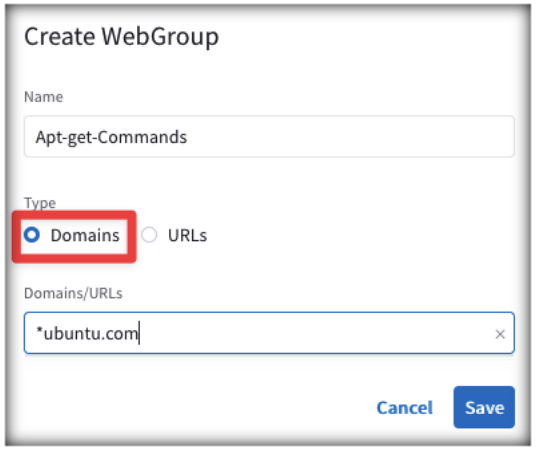


WebGroup Creation

- **WebGroups** are groupings of domains and URLs, inserted into Distributed Cloud Firewall rules, that filter (and provide security to) Internet-bound traffic.
- In addition to the predefined WebGroup ***All-Web***, you can also create two kind of custom WebGroups:
  1. **URLs WebGroup:** for HTTP/HTTPS and for other protocols, but you need to define the full Path.
     - CAVEAT: TLS Decryption must be turned on when URLs-based WebGroups are used.
  2. **Domains WebGroup:** for HTTP and HTTPS traffic (wild cards are supported – i.e. partial names).



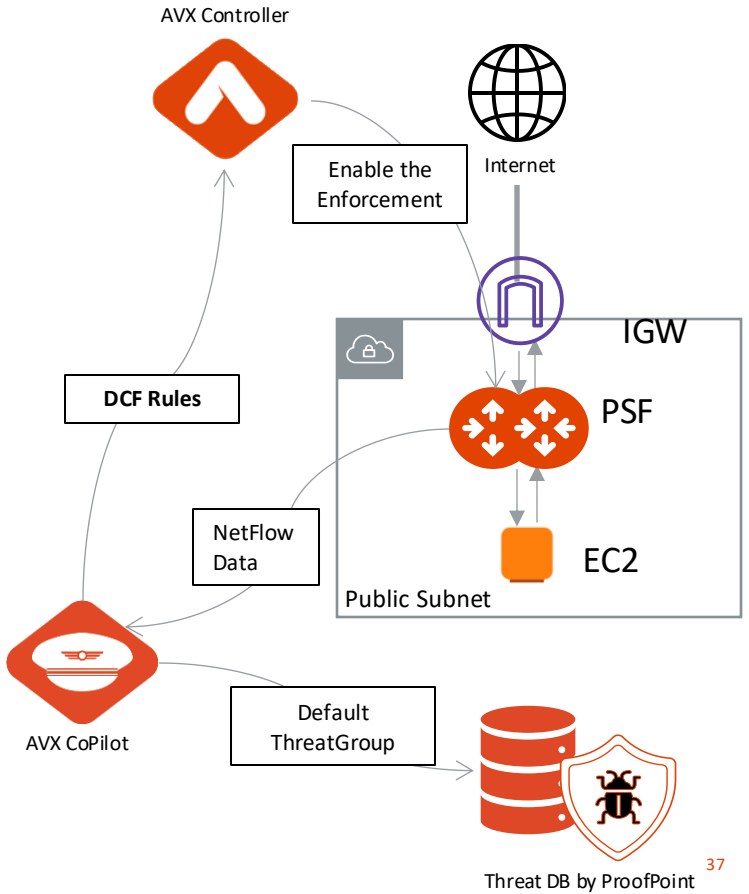




Aviatrix PSF GW(aka Public Subnet Filtering Gateway)

Aviatrix Public Subnet Filtering Gateways (PSF GWs)

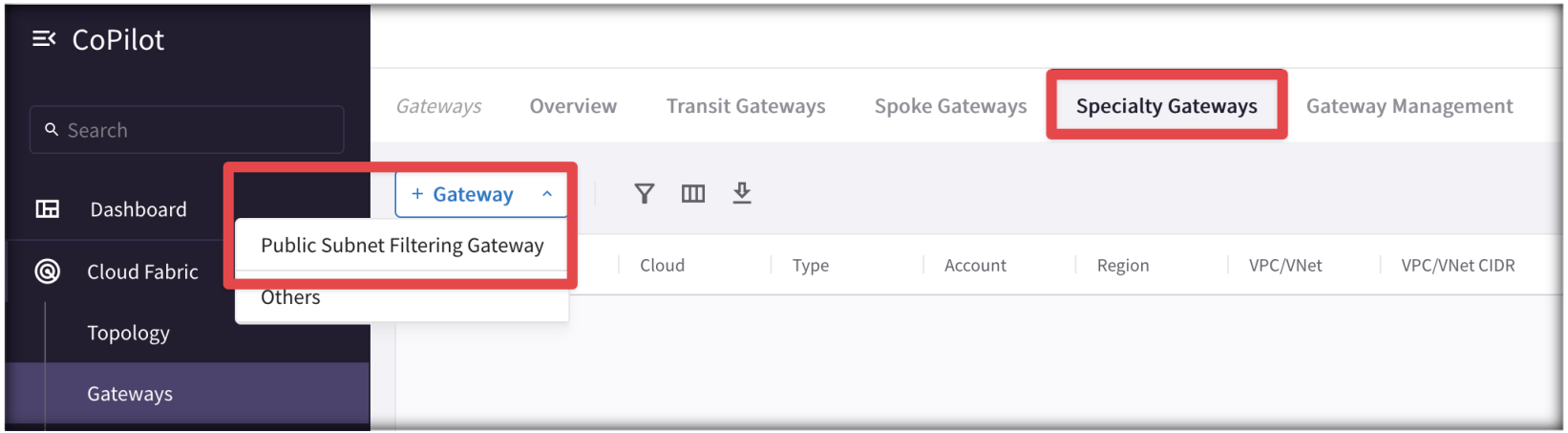
- **Public Subnet Filtering Gateways** (PSF gateways) provide ingress and egress security for **AWS** public subnets where instances have public IP addresses.
- After the Public Subnet Filtering (PSF) gateway is launched, you can apply also DCF (Distributed Cloud Firewall) rules – *enforcement must be enabled.*
- The PSF Gateway acts as a **standalone Gateway** (it's neither a Spoke nor a Transit).
- Leverage the **Default ThreatGroup** (i.e. a Malicious IP addresses DB supplied by ProofPoint) if you want to prevent attacks towards your public-facing workloads.



Aviatrix PSF Deployment Workflow (part.1)

To deploy a Public Subnet Filtering Gateway:

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

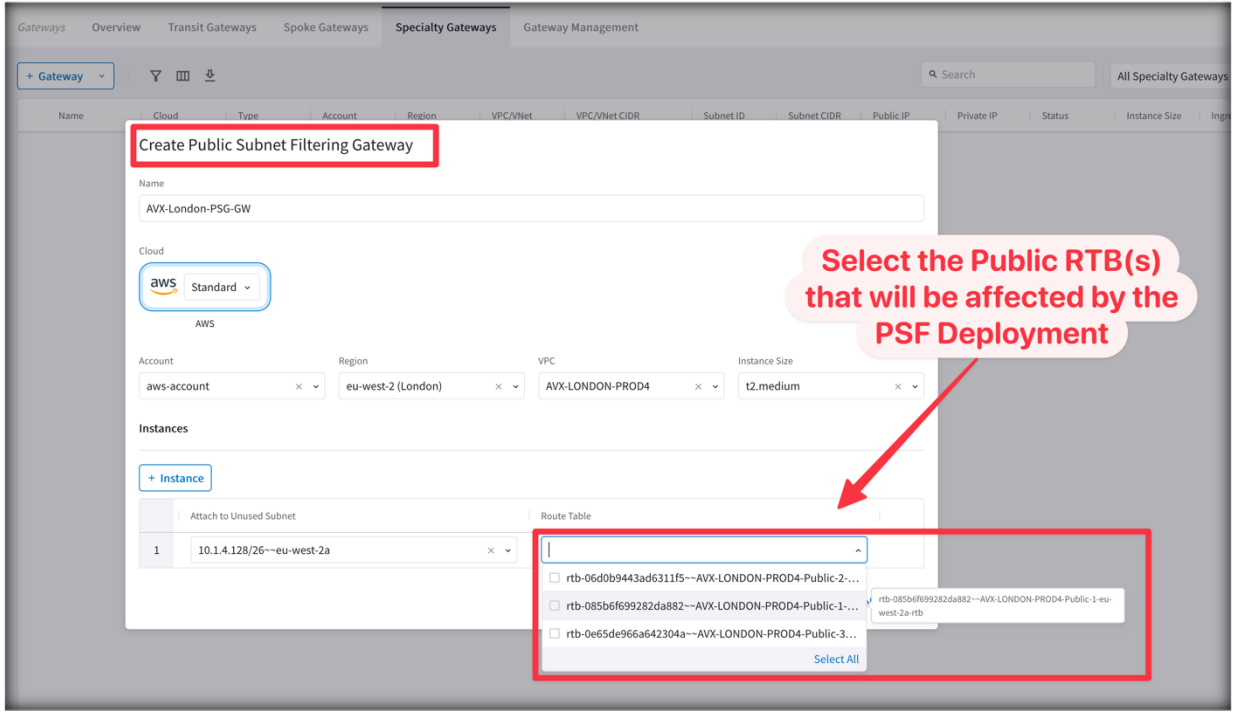


Aviatrix PSF Deployment Workflow (part.2)

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 PSF gateway in a pass through manner.



Enforcement on PSF

The Enforcement of DCF (Distributed Cloud Firewall) rules on the PSF Gateway is *disabled* by default.

- CAVEAT: This feature must be enabled if you want the AVX Controller to push DCF Rules to this standalone Gateway as well.

Lab 5 – **Aviatrix Cloud Firewall (with Secure Egress)**