FireNet Operations

ACE Solutions Architecture Team

Aviatrix Transit Firewall Network (FireNet)

- Scale out, multi-AZ FW deployments, bootstrapping
- Automated route management, segmentation, and security policies
- Deep visibility and operational capabilities
- Repeatable across regions and clouds

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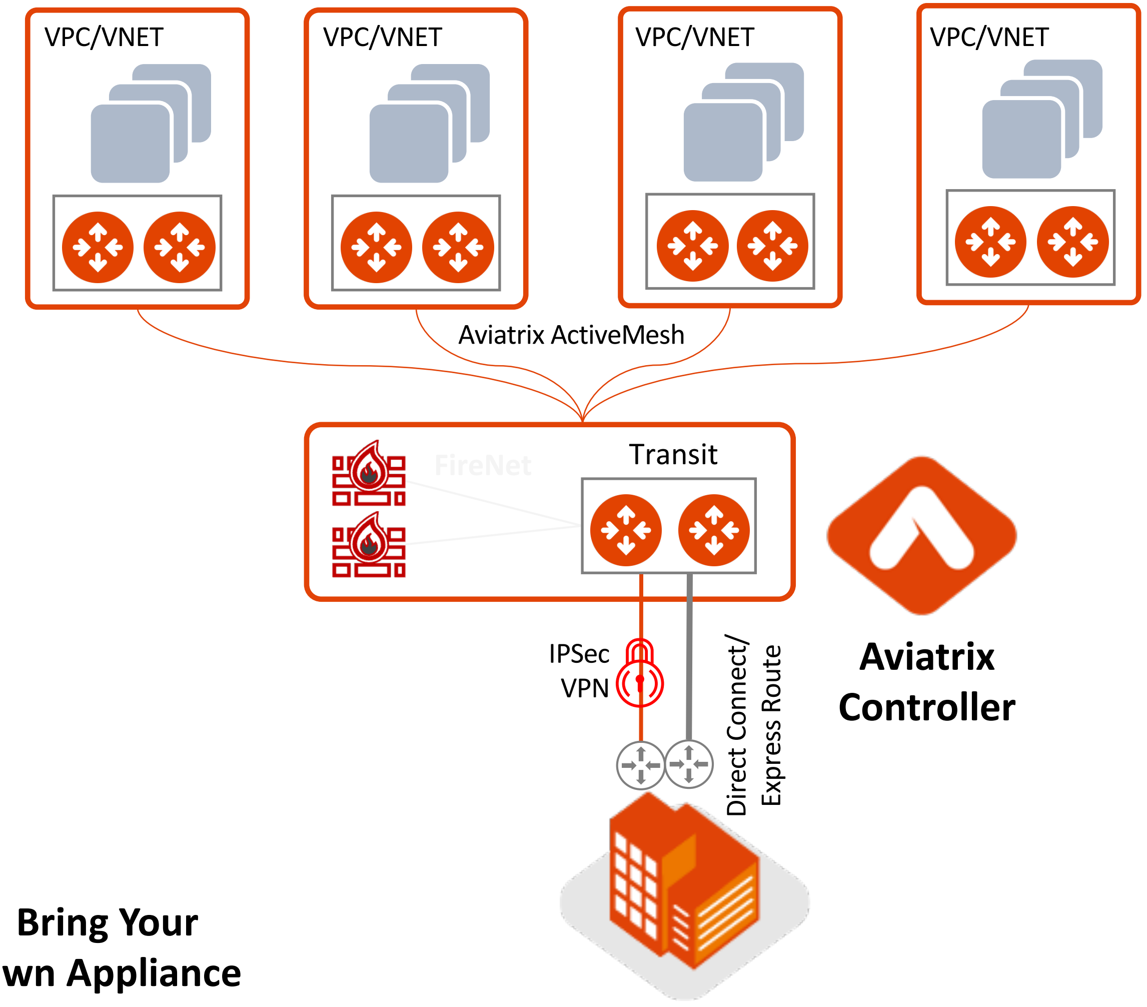
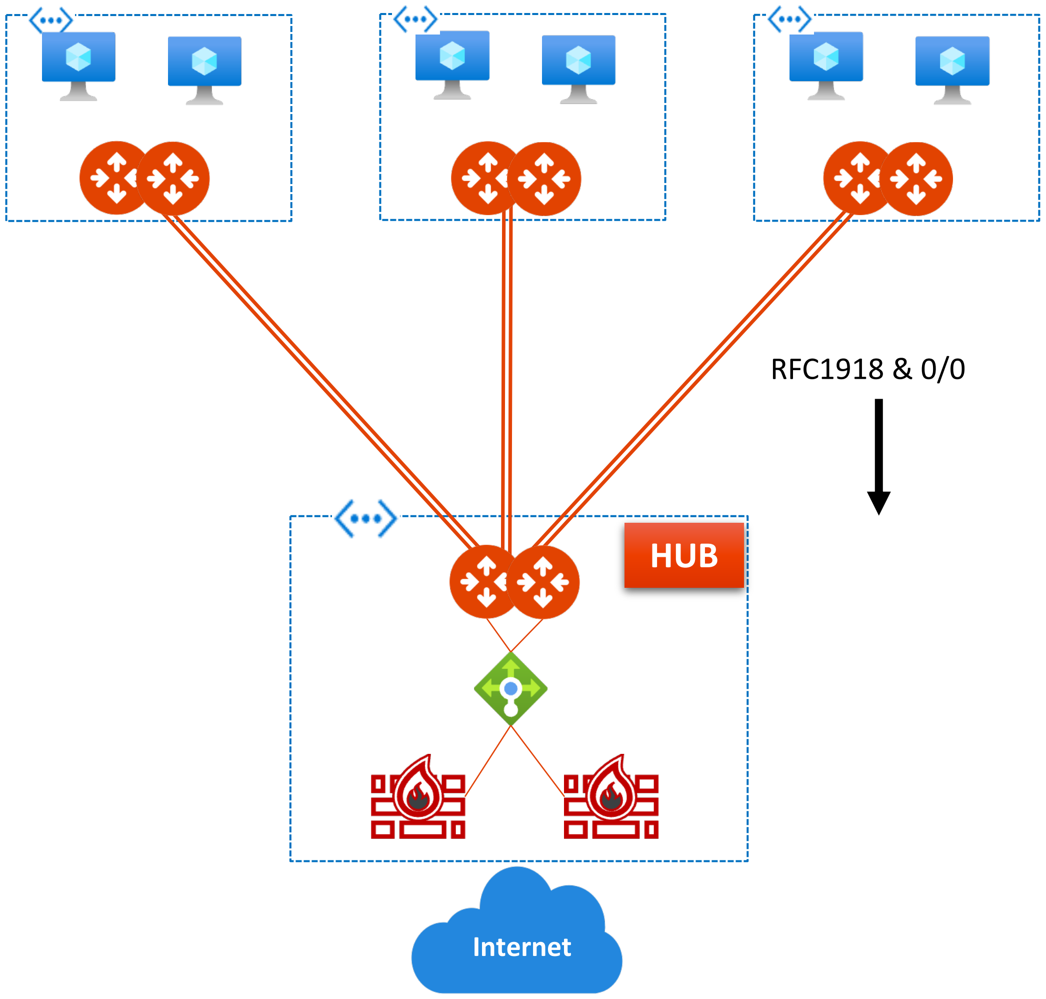
Bring Your Own Appliance



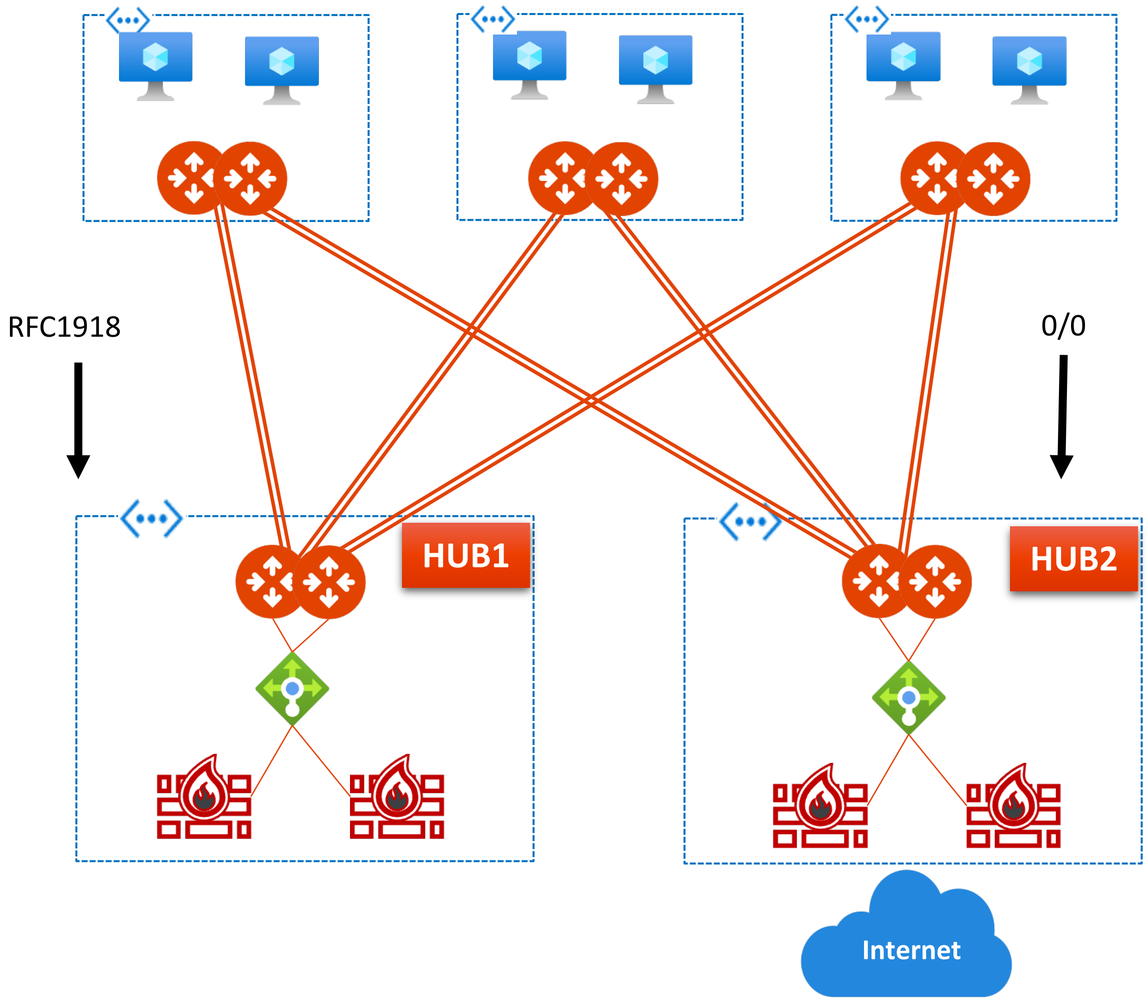
FireNet Architecture Options (Azure Example)

Each firewall set can scale independently based on need

Single HUB FireNet



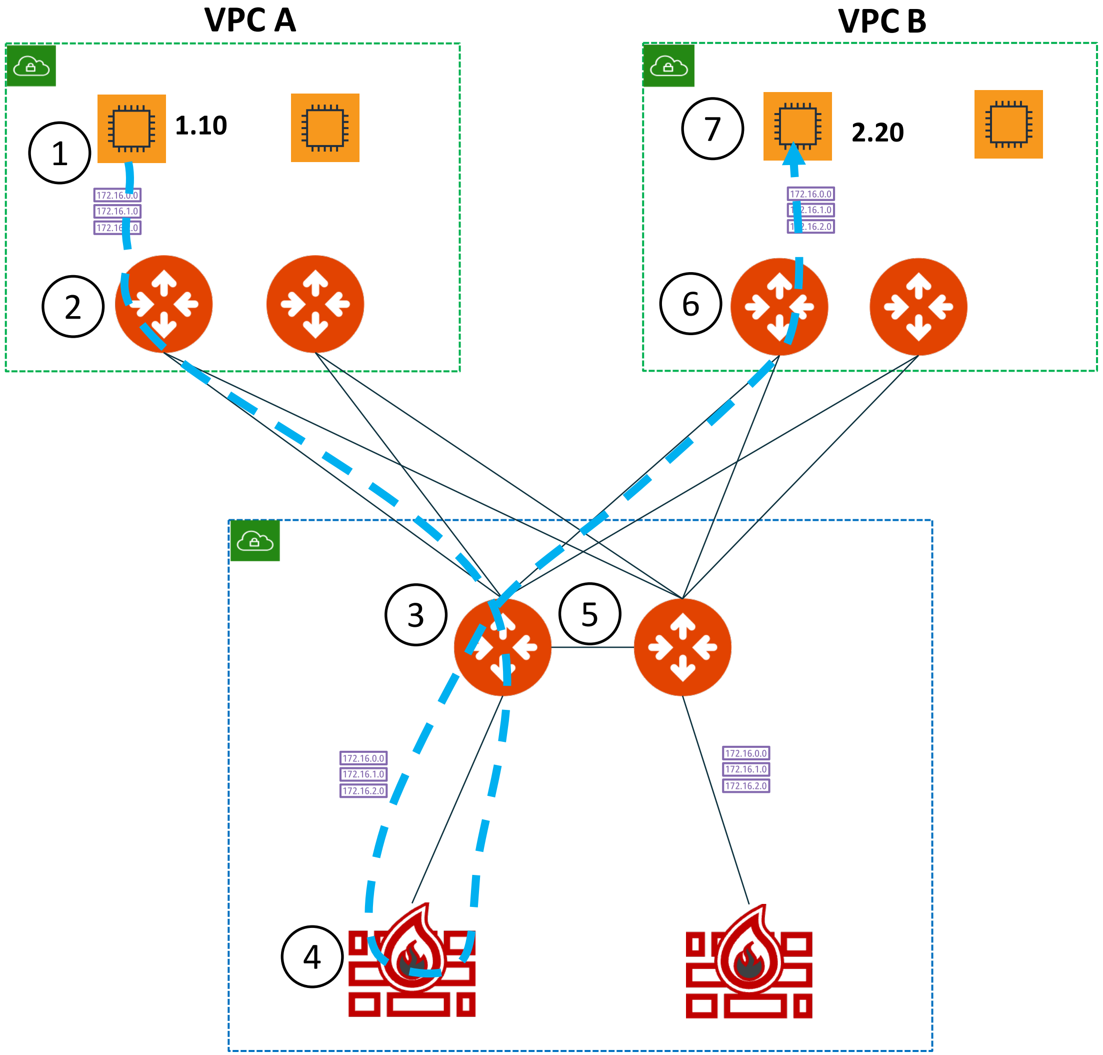
Dual HUB FireNet



FireNet Packet Walk – AWS Example

A Host 1.10 communicating with 2.20 with VPC A inspected via FireNet

1. The local route table for 1.10 has RFC1918 routes pointed to its local gateway.
2. The local Aviatrix spoke gateway will ECMP traffic with 5-tuple hash to one of the Aviatrix Transit Gateways.
3. The Aviatrix Transit Gateway receiving the flow will check inspection policy to determine if either source or destination requires FireNet. If a match, traffic is redirected to the firewall in the same AZ.
4. The Firewall selected will process the packet and send the traffic back to its defined Transit Gateway.
5. The Aviatrix Transit Gateway will receive the processed packet and forward (ECMP) with 5-tuple hash towards the destination spoke.
6. The destination spoke gateway will receive the traffic and route the traffic out its local interface to the VPC route table. Note that this GW may not be in the same AZ as the destination instance.
7. The destination will receive the original traffic and see this as native VPC communication flow.

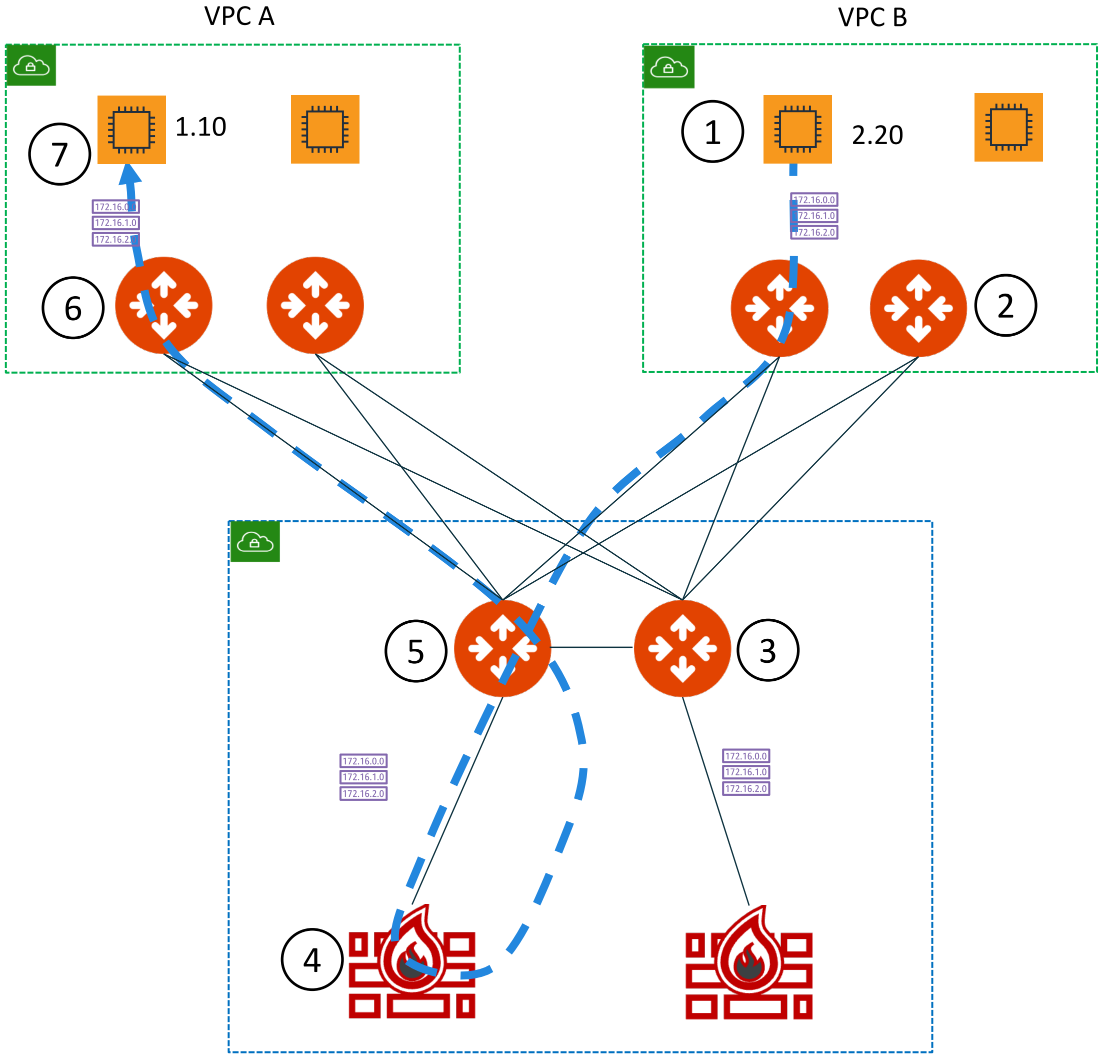


Aviatrix Transit tracks the health of Firewall

FireNet Packet Walk – AWS Example

Return Flow: 1.10 communicating with 2.20 with VPC A inspected via FireNet

1. The local route table for 2.20 has RFC1918 routes pointed to its local spoke gateway for return traffic.
2. The local Aviatrix spoke gateway will ECMP traffic with 5-tuple hash to one of the Aviatrix Transit Gateways.
3. The Aviatrix Transit Gateway receiving the traffic will pass the traffic to the the same FW which handled the initial flow to maintain symmetry.
4. The stateful Firewall will process the return traffic and route the traffic back to its designated gateway.
5. The Aviatrix gateway will ECMP traffic with 5-tuple hash to one of the destination spoke gateways.
6. The destination spoke gateway will route this traffic out its local interface to the native VPC route table.
7. The original source will receive the return traffic and see this as native VPC communication flow.

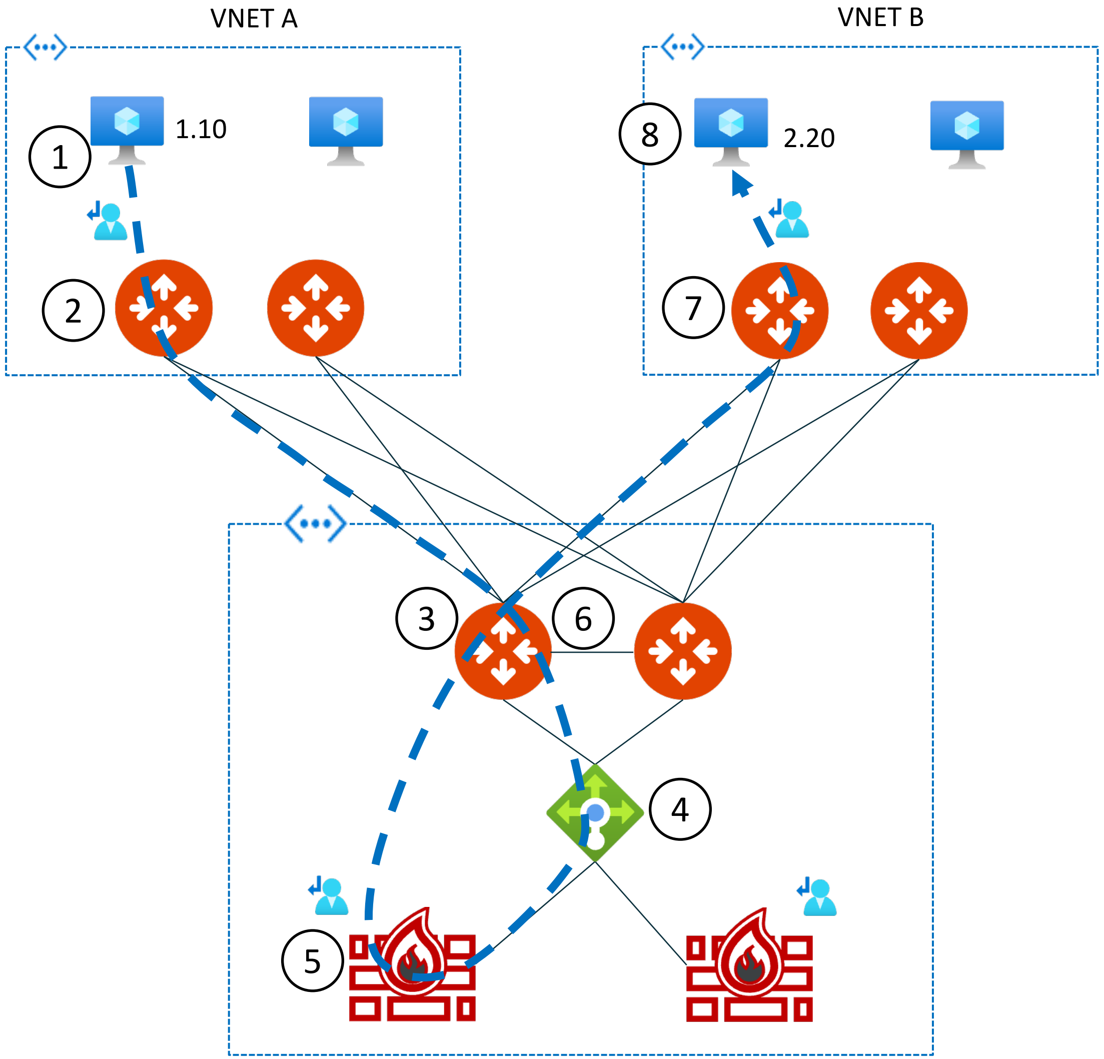


FireNet Packet Walk – Azure Example

A Host 1.10 communicating with 2.20 with VNET A inspected via FireNet

1. The local route table for 1.10 has RFC1918 routes pointed to its local gateway.
2. The local Aviatrix spoke gateway will ECMP traffic with 5-tuple hash to one of the Aviatrix Transit Gateways.
3. The Aviatrix Transit Gateway receiving the flow will check the inspection policy to determine if either source or destination requires FireNet. If a match, traffic is redirected to Azure ILB.
4. The Azure ILB will perform a 5-tuple hash to send the traffic to one of the backend pool members.
5. The Firewall selected will process the packet and send the traffic back to its defined Transit Gateway.
6. The Aviatrix Transit Gateway will receive the processed packet and forward (ECMP) with 5-tuple hash towards the destination spoke.
7. The spoke gateway will receive the traffic and route the traffic out its local interface to the Azure VNET route table.
8. The destination will receive the original traffic and see this as native Azure communication flows.

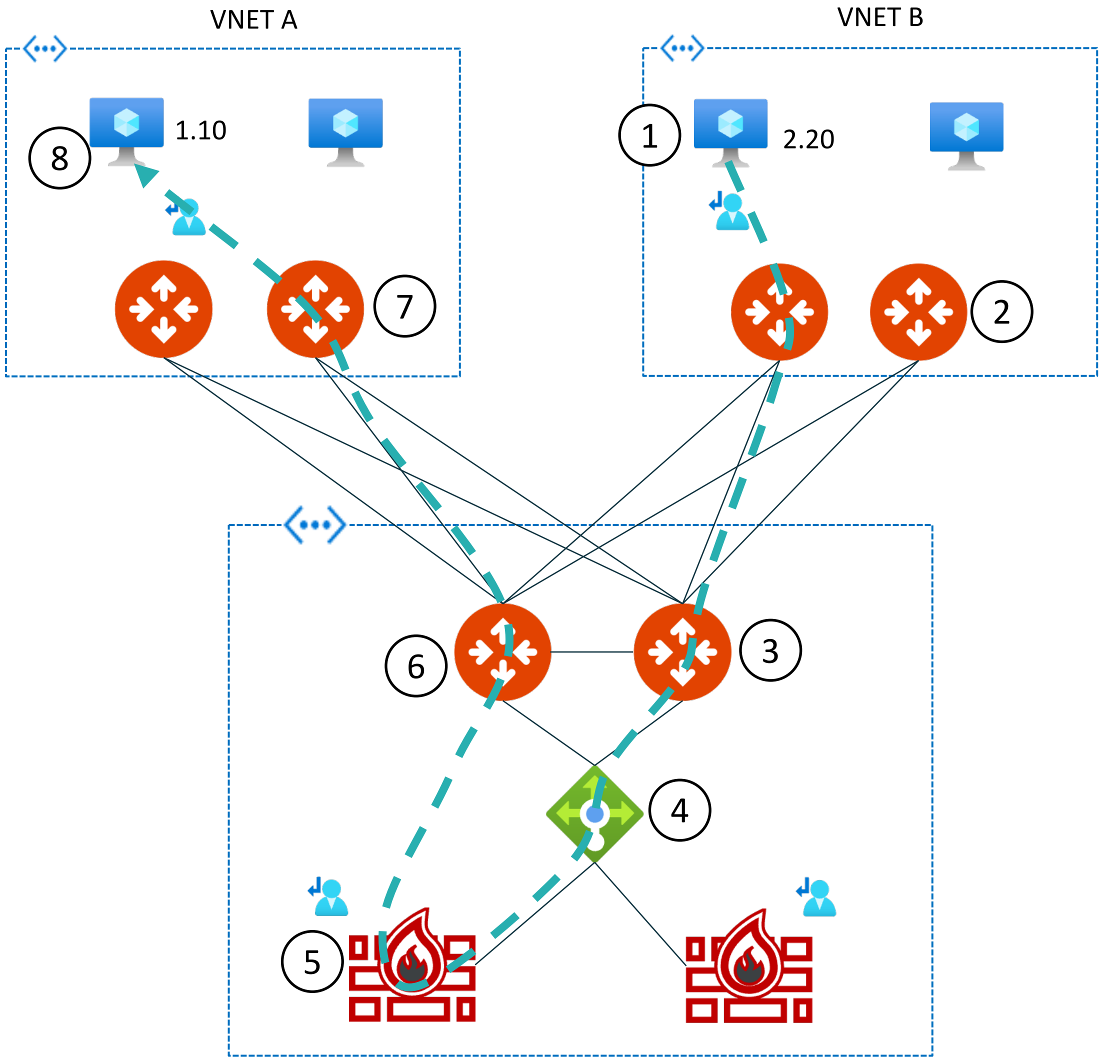
ILB tracks the health of Firewall
Health check is not configurable in Azure via Controller



FireNet Packet Walk – Azure Example

Return Flow: 1.10 communicating with 2.20 with VNET A inspected via FireNet

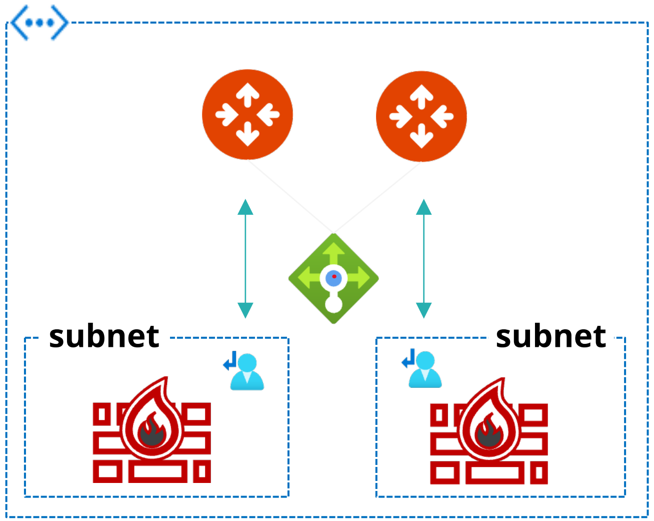
1. The local route table for 2.20 has RFC1918 routes pointed to its local spoke gateway for return traffic.
2. The local Aviatrix spoke gateway will ECMP traffic with 5-tuple hash to one of the Aviatrix Transit Gateways.
3. The Aviatrix Transit Gateway receiving the traffic will pass the traffic to the ILB. The gateway will PBR the traffic back to the ILB for FireNet.
4. The Azure load balancer will hash the traffic however, the reverse flow hash will match the initial flow to ensure symmetry.
5. The stateful Firewall will process the return traffic and route the traffic back to its designated gateway.
6. The Aviatrix gateway will ECMP traffic with 5-tuple hash to one of the destination spoke gateways.
7. The destination spoke gateway will route this traffic out its local interface to the native Azure route table
8. The original source will receive the return traffic and see this as native Azure communication flows



FireNet in Azure – 3 States

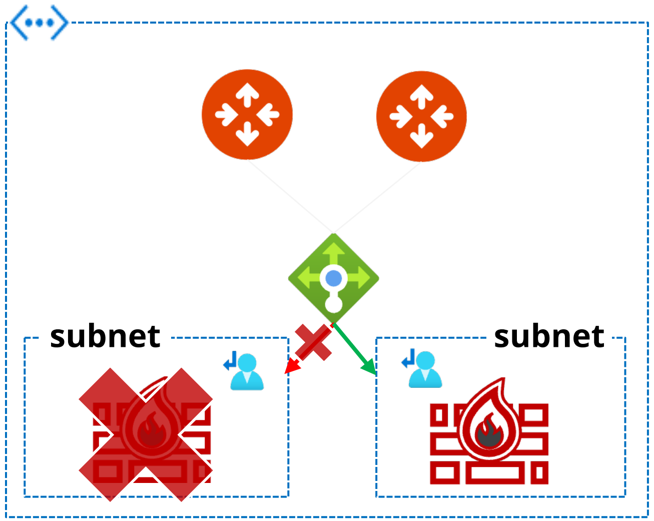
Steady State

- Each Firewall is associated to an Aviatrix Transit GW
- Firewalls are part of the LB backend pool
- UDR in each Firewall subnet point to a single gateway



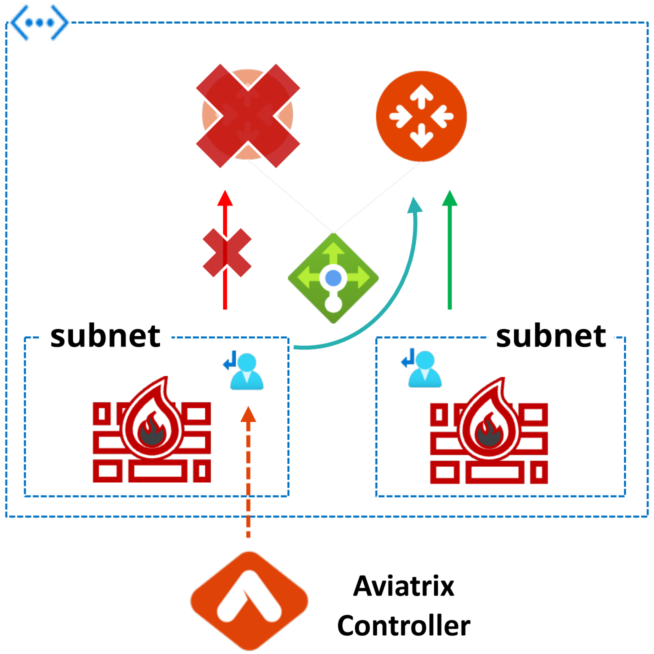
Firewall Failure State

- Each Firewall is associated to an Aviatrix Transit GW
- Firewalls are part of the LB backend pool
- If Firewall fails, LB will remove the firewall from the backend pool



Gateway Failure State

- Each Firewall is associated to an Aviatrix Transit GW
- UDR in each Firewall subnet point to a single gateway
- If Gateway fails, an API call is made to update the UDR to point to the other healthy gateway



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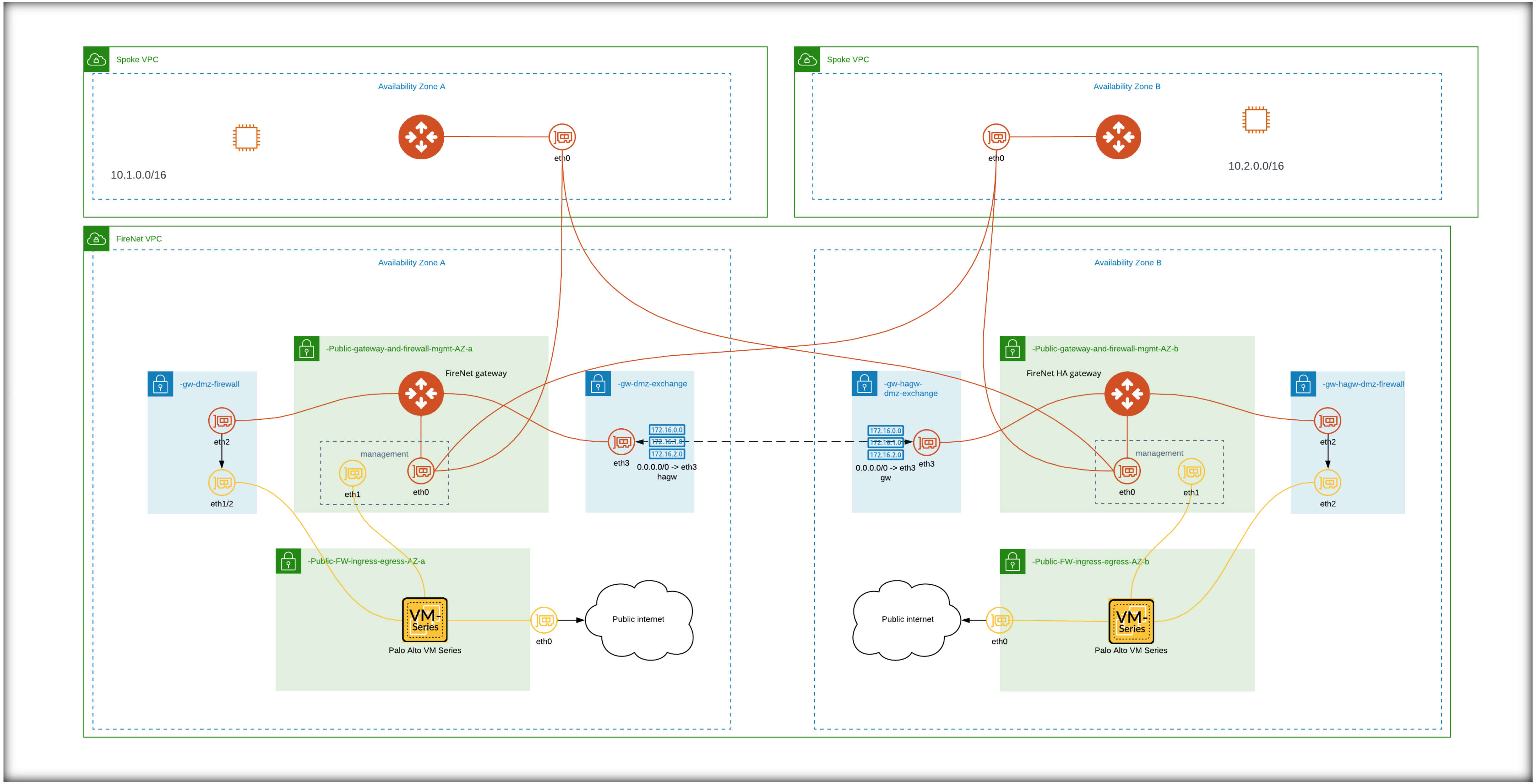
Tools for Operating your FireNet

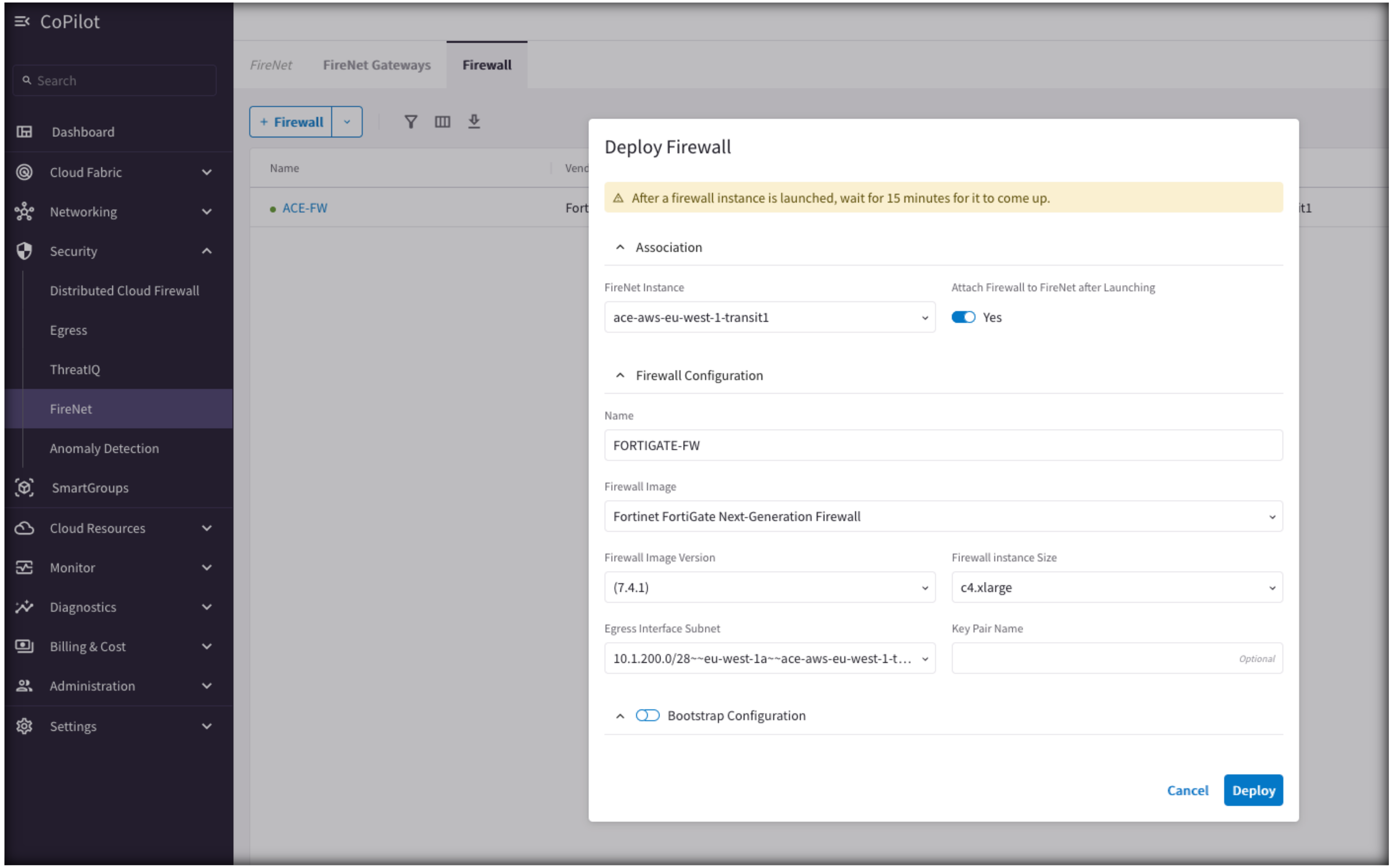
FireNet – Under the hood



Firewall Deployment Workflow

- **PATH**: Security > FireNet > Firewall
  1. Select the Transit FireNet GW
  2. Select the Firewall Image (requirement: *Subscribe to the firewall instance from the Marketplace*)
  3. Firewall Image Version
  4. Firewall Instance Size
  5. Egress Interface Subnet
  6. Management Interface Subnet (Palo Alto/AWS only)
  7. Bootstrap Configuration (*optional*)

- **Supported Firewall Vendors**: Palo Alto VM-Series, Check Point CloudGuard, Fortinet FortiGate, BYOA
  - **Panorama** is also supported as a firewall manager for Palo Alto VM-Series.



Deploy Firewall

⚠ After a firewall instance is launched, wait for 15 minutes for it to come up.

Association

FireNet Instance: ace-aws-eu-west-1-transit1

Attach Firewall to FireNet after Launching: Yes

Firewall Configuration

Name: FORTIGATE-FW

Firewall Image: Fortinet FortiGate Next-Generation Firewall

Firewall Image Version: (7.4.1)

Firewall instance Size: c4.xlarge

Egress Interface Subnet: 10.1.200.0/28~~eu-west-1a~~ace-aws-eu-west-1-t…

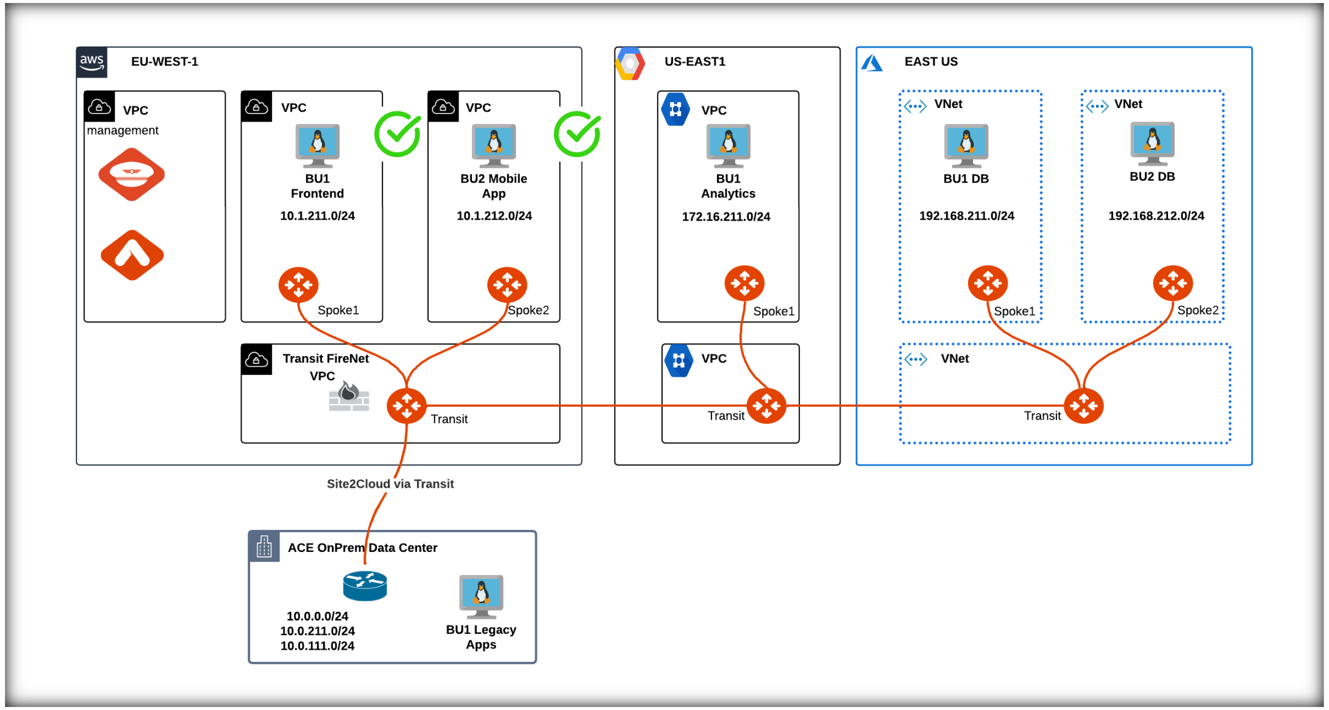
Key Pair Name: *Optional*

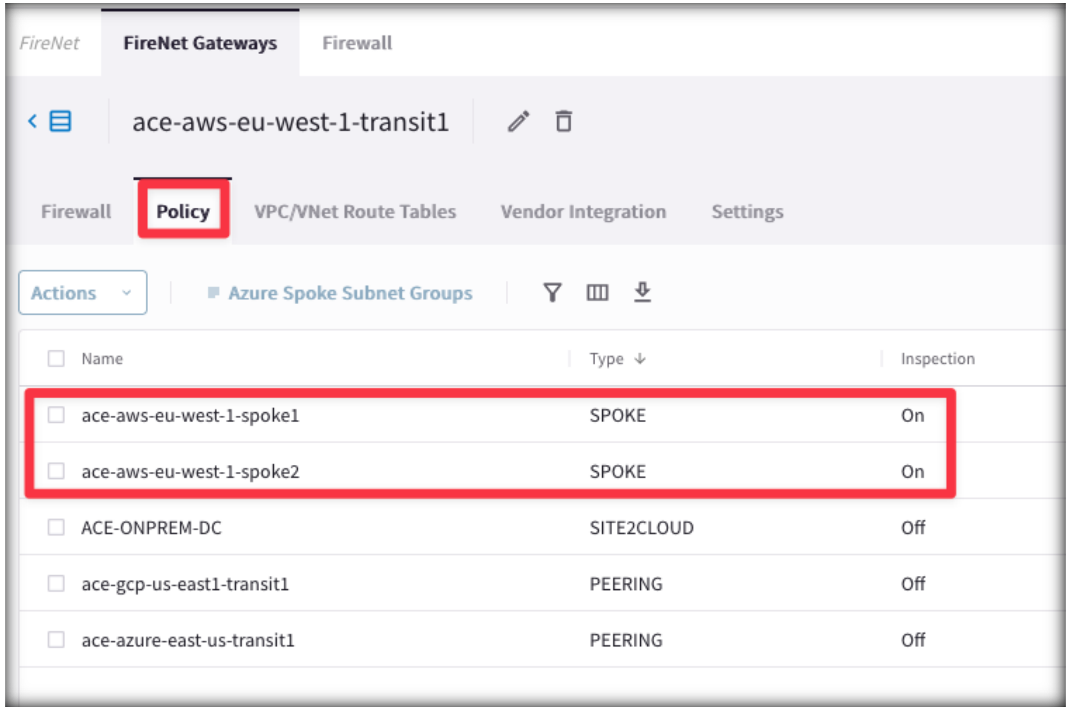
Bootstrap Configuration

Cancel Deploy

Inspection Policy

- On the FireNet Policy tab you can add or remove **inspection policies** for the selected FireNet. When an inspection policy is added the traffic related to the Transit FireNet's attachment (Spoke/Edge gateway, peered Transit, Site2Cloud connection) is inspected by the firewall within the selected Transit FireNet.
- *By default*, FireNet inspects ingress and east-west traffic only.

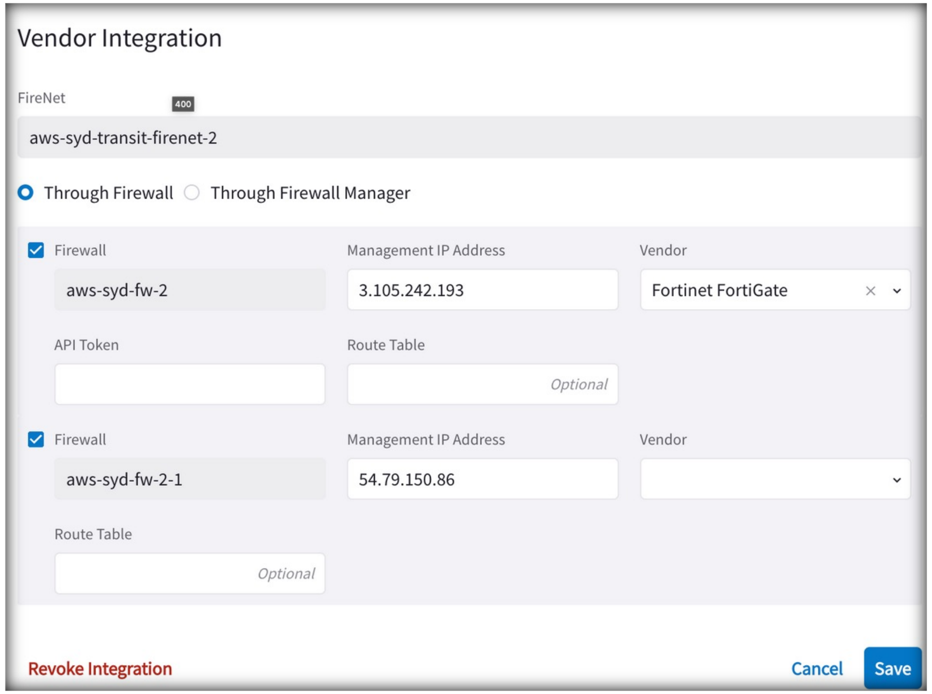




Name	Type	Inspection
ace-aws-eu-west-1-spoke1	SPOKE	On
ace-aws-eu-west-1-spoke2	SPOKE	On
ACE-ONPREM-DC	SITE2CLOUD	Off
ace-gcp-us-east1-transit1	PEERING	Off
ace-azure-east-us-transit1	PEERING	Off

Vendor Integration

- The Vendor Integration function allows the Controller to log into a firewall or firewall manager and change the route table on the firewall to program the routing for FireNet, or to change routing if a gateway in FireNet fails.
- Vendor Integration allows to configure the **RFC 1918 routes** and **non-RFC 1918 routes** on the Vendor's firewall instance



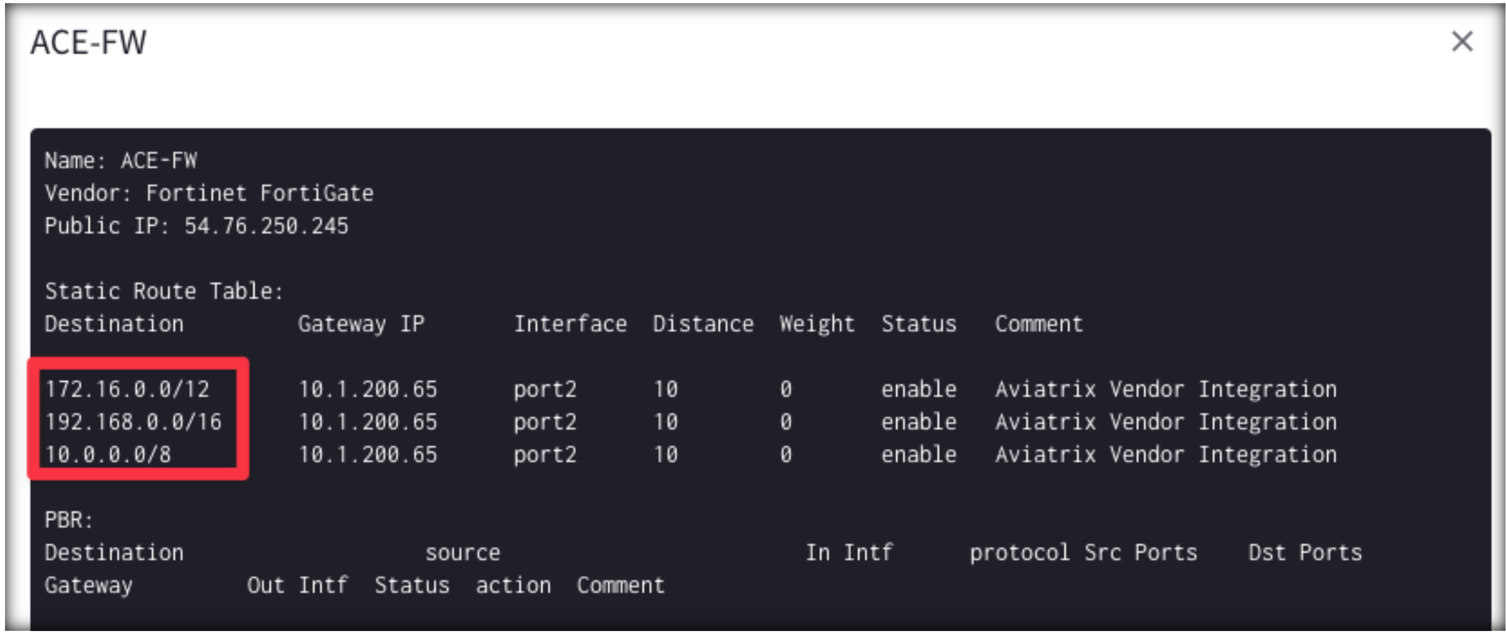
Vendor Integration

FireNet

aws-syd-transit-firenet-2

● Through Firewall ○ Through Firewall Manager

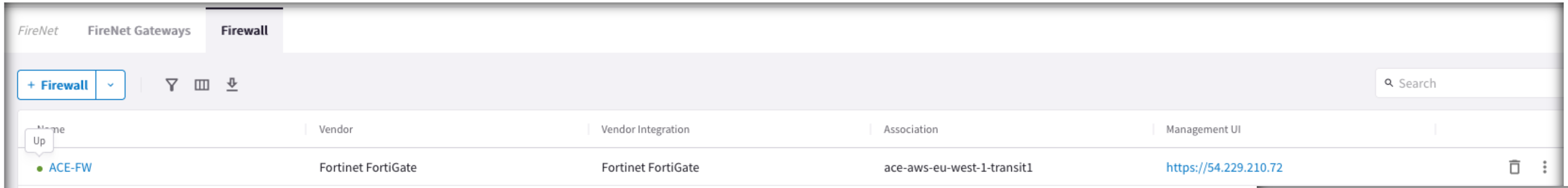
☑ Firewall	Management IP Address	Vendor
aws-syd-fw-2	3.105.242.193	Fortinet FortiGate
API Token	Route Table	
	Optional	
☑ Firewall	Management IP Address	Vendor
aws-syd-fw-2-1	54.79.150.86	
Route Table		
Optional		



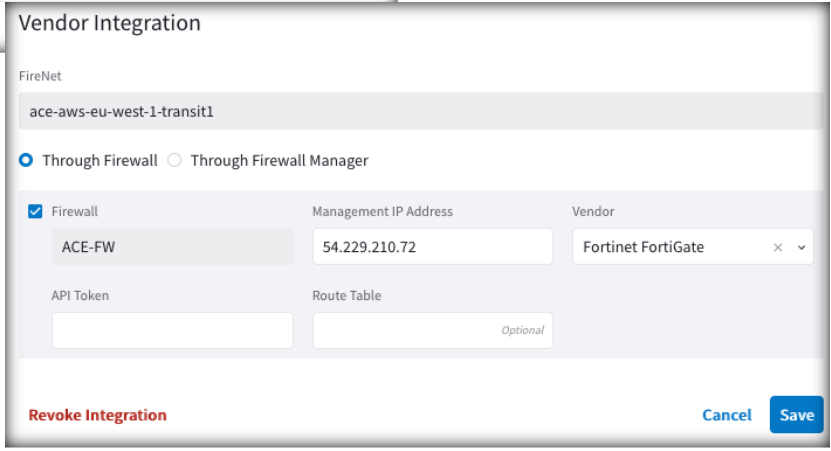
ACE-FW

```
Name: ACE-FW
Vendor: Fortinet FortiGate
Public IP: 54.76.250.245

Static Route Table:
Destination        Gateway IP       Interface  Distance  Weight  Status   Comment

172.16.0.0/12      10.1.200.65      port2      10        0       enable   Aviatrix Vendor Integration
192.168.0.0/16     10.1.200.65      port2      10        0       enable   Aviatrix Vendor Integration
10.0.0.0/8         10.1.200.65      port2      10        0       enable   Aviatrix Vendor Integration

PBR:
Destination                  source                      In Intf      protocol Src Ports     Dst Ports
Gateway          Out Intf  Status  action  Comment
```

Information to Collect / Checklist



Name	Vendor	Vendor Integration	Association	Management UI
● ACE-FW (Up)	Fortinet FortiGate	Fortinet FortiGate	ace-aws-eu-west-1-transit1	https://54.229.210.72



Vendor Integration

FireNet: ace-aws-eu-west-1-transit1

● Through Firewall ○ Through Firewall Manager

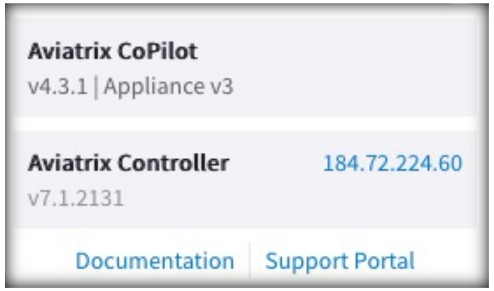
☑ Firewall	Management IP Address	Vendor
ACE-FW	54.229.210.72	Fortinet FortiGate

API Token	Route Table
	Optional

- Make sure Aviatrix sees the FW as “healthy”
  - For Ingress: Check if any native LB deployed in front of the FWs is also configured correctly
- Vendor Integration: make sure the controller can reach the FW
  - Nothing preventing the communication, NACLs, NSGs, SLs, etc.
- Make sure there are no “uncommitted” pending changes on the FW
- Make sure your Network Domain/Spoke is configured for inspection
- Make sure Connected Transit is enabled (if necessary)
- Make sure your Spoke is attached to Transit
- Verify Spoke and Transit GW routes in Cloud Fabric > Gateways

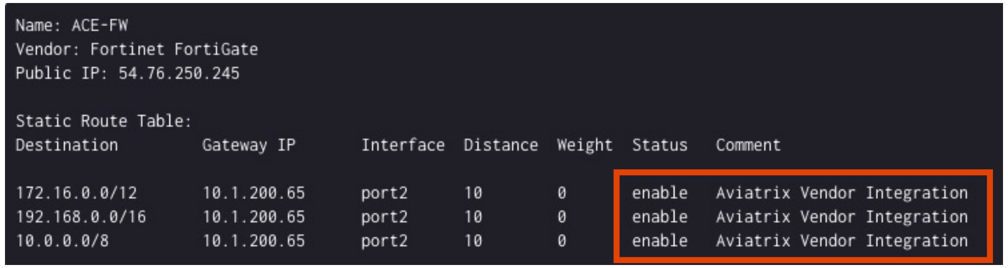
Information to Collect - Checklist for the Support Team

- Aviatrix Controller version
- Firewall Vendor
- Transit FireNet: Inspection Policy
  - Is the Spoke VPC/VNet supposed to be Inspected at all?
- E/W Traffic inspection enabled?
- Egress Traffic inspection enabled?
- Ingress Traffic enabled and working?
- Exclude list created for CIDR/IP from being inspected by FireNet?
- Is there any automation running every day / hour / ?



Aviatrix CoPilot
v4.3.1 | Appliance v3

Aviatrix Controller 184.72.224.60
v7.1.2131



```
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Vendor: Fortinet FortiGate
Public IP: 54.76.250.245

Static Route Table:
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172.16.0.0/12       10.1.200.65      port2      10        0       enable   Aviatrix Vendor Integration
192.168.0.0/16      10.1.200.65      port2      10        0       enable   Aviatrix Vendor Integration
10.0.0.0/8          10.1.200.65      port2      10        0       enable   Aviatrix Vendor Integration
```
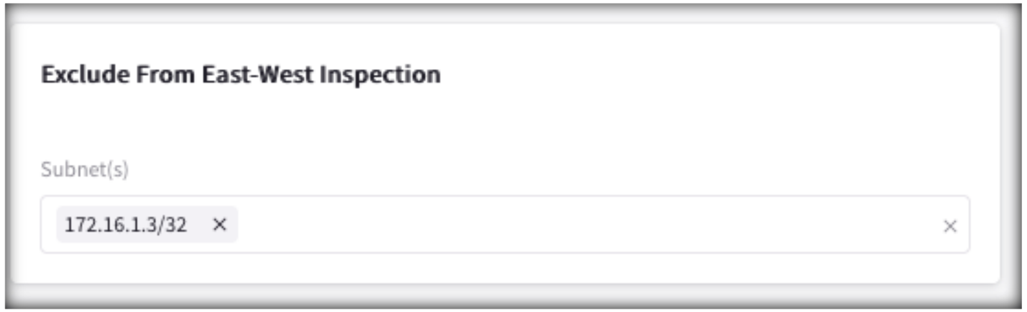
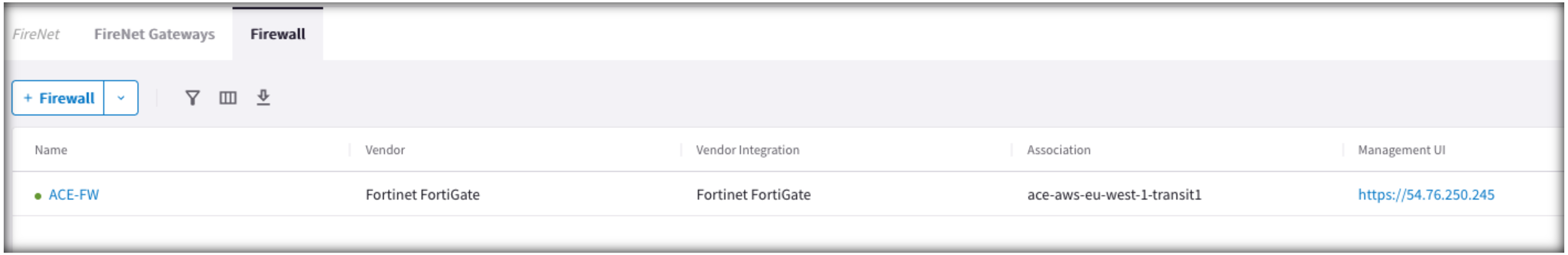



Exclude From East-West Inspection

Subnet(s): 172.16.1.3/32 ×



Name	Vendor	Vendor Integration	Association	Management UI
● ACE-FW	Fortinet FortiGate	Fortinet FortiGate	ace-aws-eu-west-1-transit1	https://54.76.250.245

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Next:

Lab 3 FireNet - Interface
Lab 4 FireNet - Routes