Firewall Networks (FireNet)

ACE Solutions Architecture Team

Firewalling in the Cloud

Layered Security Model - Defense in depth

Intra-Spoke Traffic – Distributed

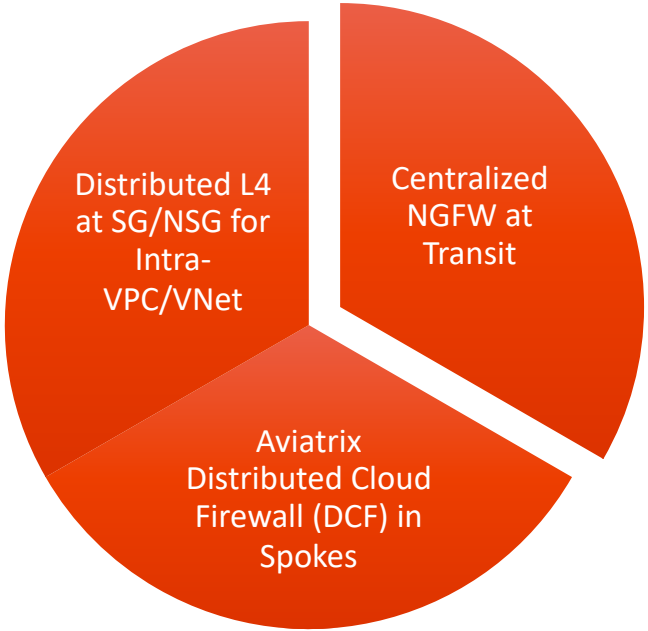
- Best handled by L4 SG/NSGs (Aviatrix can do it)
- Lifecycle tied with compute instances (CI/CD)
- Provisioned/de-provisioned by automation

E/W and N/S Inspection – Distributed

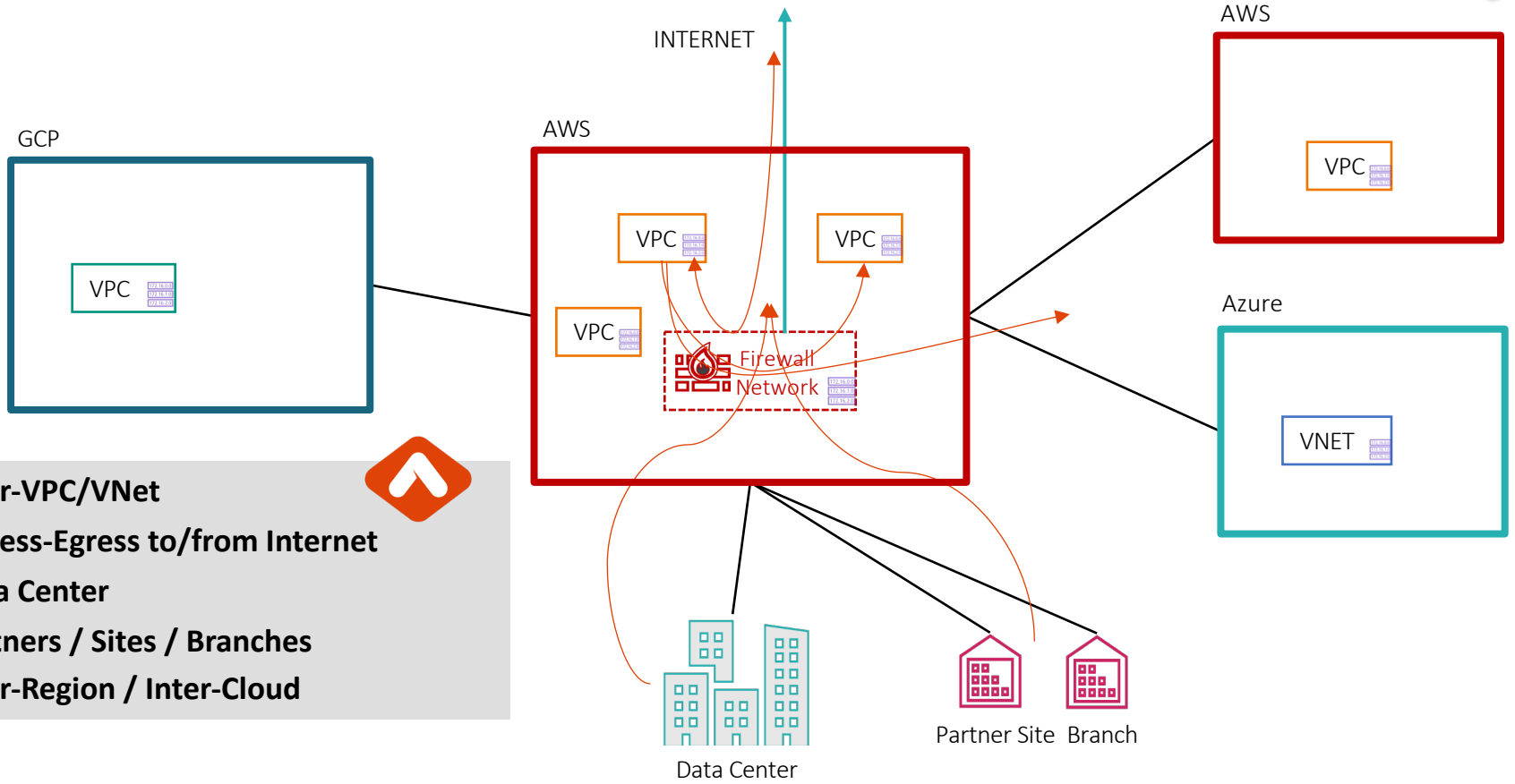
- Handle via Aviatrix L7 Firewall
- Relieves 3rd party Firewalls from processing
- Reduces cost by fewer egress charges and expensive firewalls
- Close to applications/workloads

E/W and N/S Inspection – Centralized

- Best handled via a 3rd Party Firewall
- Aviatrix provides Service Insertion, policy, and life-cycle management of 3rd party firewalls.
- Centralized security policy from the 3rd party firewall platform



Centralized Firewall Traffic Patterns



1. **Inter-VPC/VNet**
2. **Ingress-Egress to/from Internet**
3. **Data Center**
4. **Partners / Sites / Branches**
5. **Inter-Region / Inter-Cloud**

Challenges of Service Insertion in the Cloud

Firewall Vendors

- Firewall vendors have repackaged on-prem solutions to cloud
- Not focused to solve cloud networking and challenges
- Expect customer to own routing traffic to and from FWs

Cloud Provider

- Solution which might lack enterprise features you need
- Expect customer to figure out routing traffic to and from FWs
- Lack of visibility and troubleshooting tools

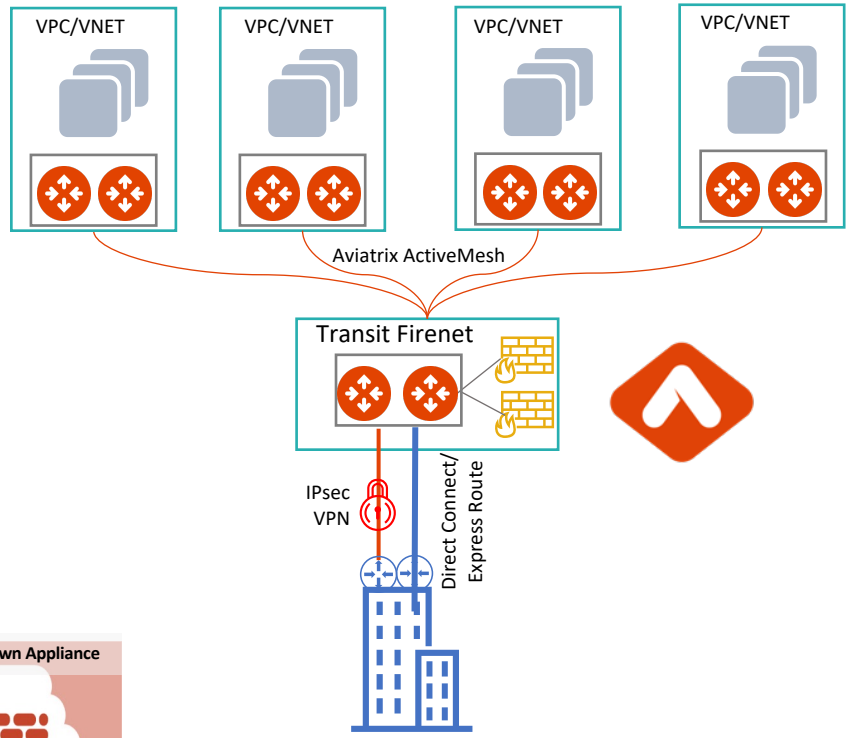
Customer

- Manually figure out routing and troubleshooting
- Many components involved that require individual config/ops (LB, NAT GWs, routes, etc.)
- Lack of visibility and troubleshooting tools reduces efficiency and increases risk

Aviatrix Transit FireNet

Aviatrix Encrypted Transit Firewall Network

- Scale out, multi-AZ FW deployments
- Automated route management
  Segmentation and Connection Policies
- Deep visibility and operational capabilities
- Repeatable architecture, across regions
  and clouds



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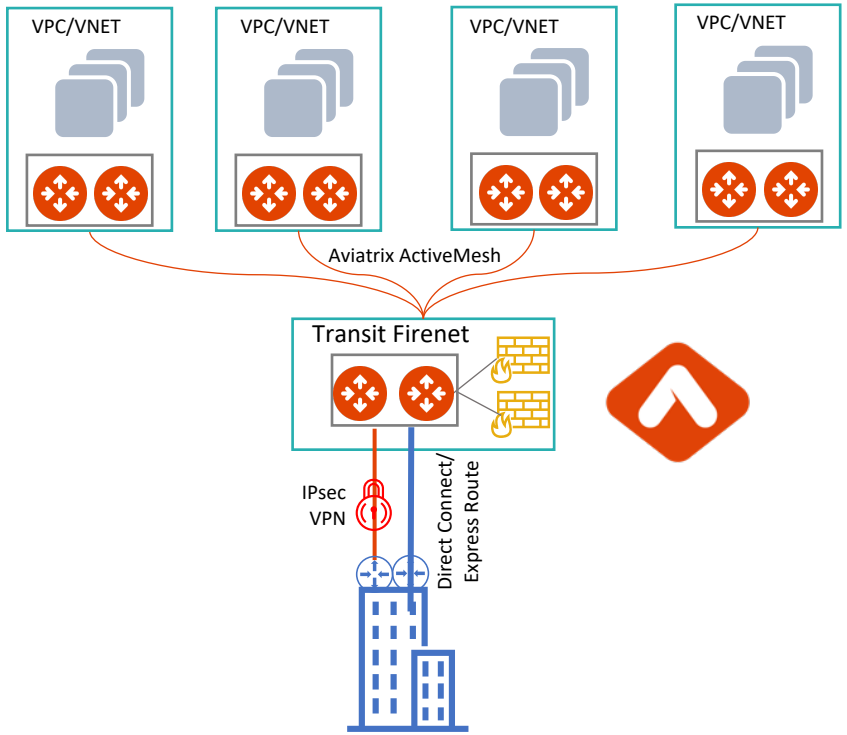
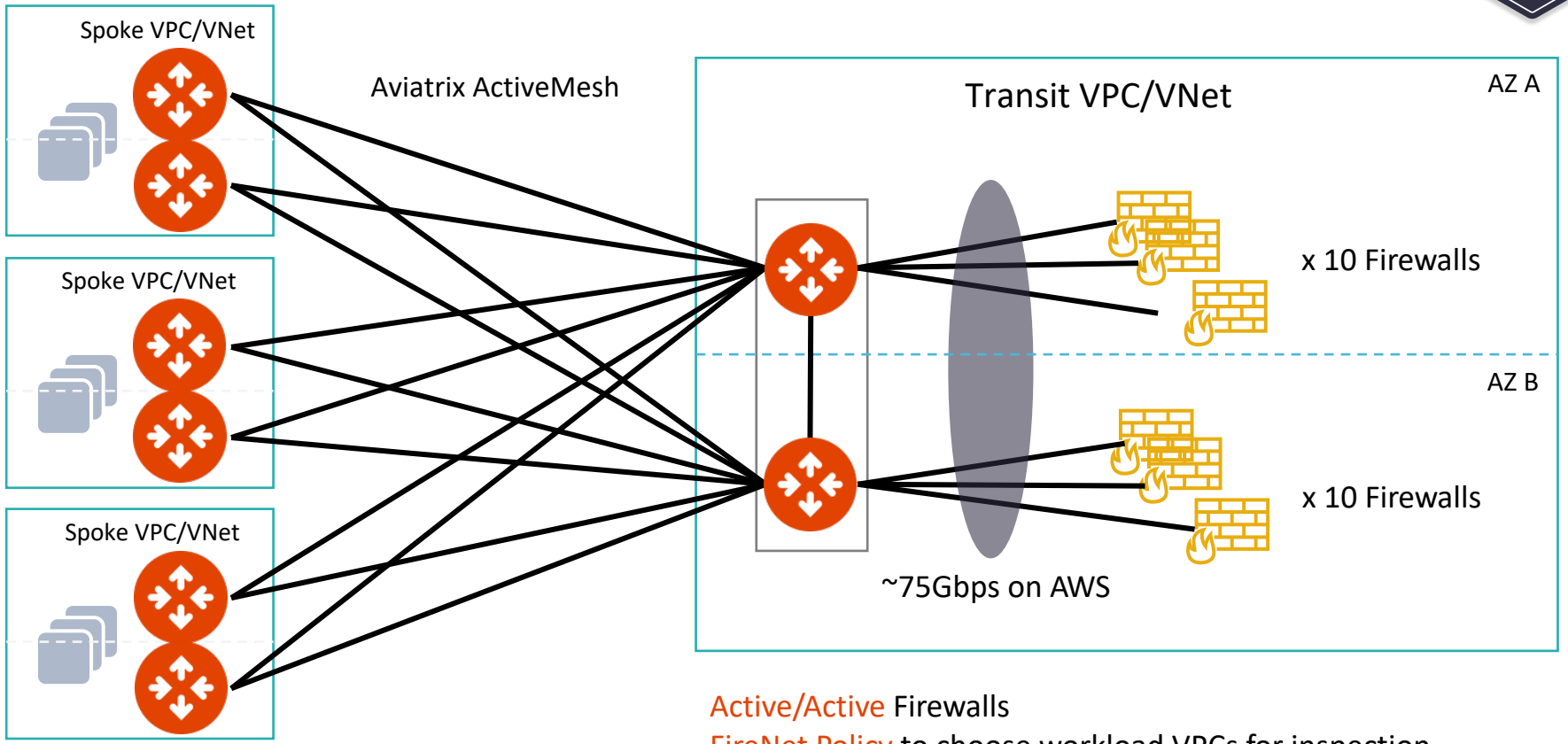
Aviatrix Encrypted Transit Firewall Network

1. From the Aviatrix CoPilot, you enable FireNet (or through TF)
2. Aviatrix Controller deploys the Firewalls.
3. Aviatrix Controller configures the interfaces and routing entries on the firewalls.
4. No SNAT, IPsec, BGP, or other elements are required to insert the FWs into the traffic path.
5. Aviatrix Controller ensures all the Spokes and other connected networks marked for inspection have their traffic inspected by the FW.
6. Aviatrix Controller monitors the health of the FW instances and ensures the traffic is only forwarded to “up” Firewalls.
7. Aviatrix GWs or a native cloud LB incorporated into the overall design ensures the traffic is correctly load-balanced to all available FWs while maintaining the session stickiness.



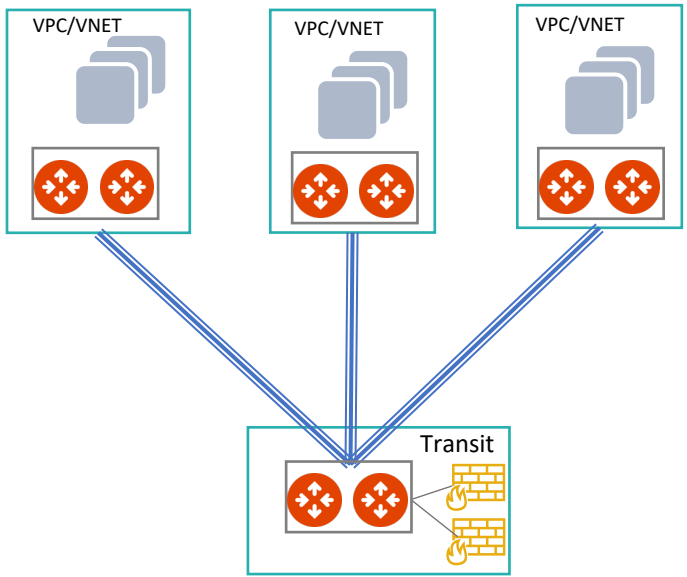
Aviatrix Transit FireNet Performance



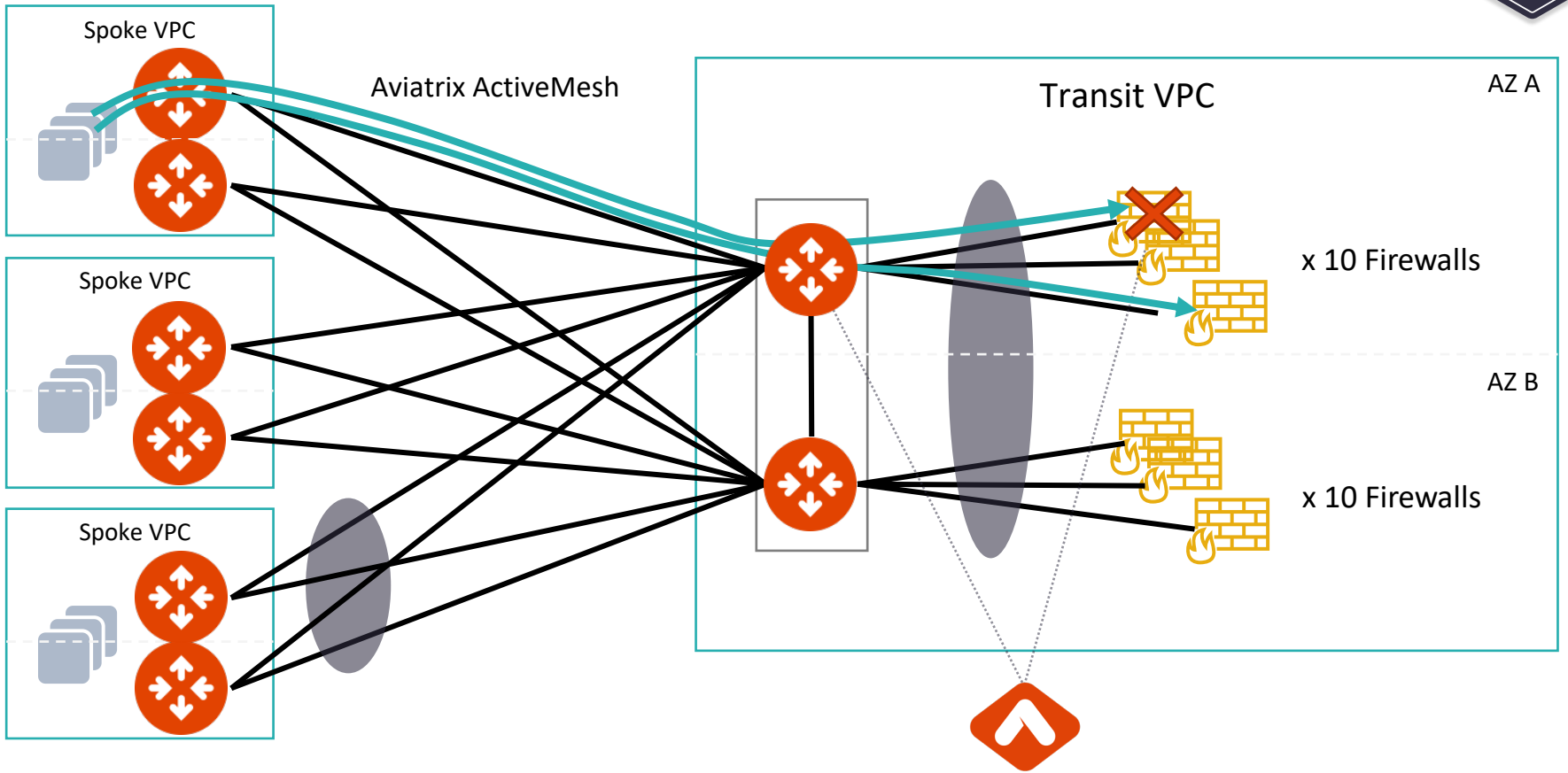
Active/Active Firewalls
FireNet Policy to choose workload VPCs for inspection

Aviatrix Transit FireNet Load Balancing and Failover

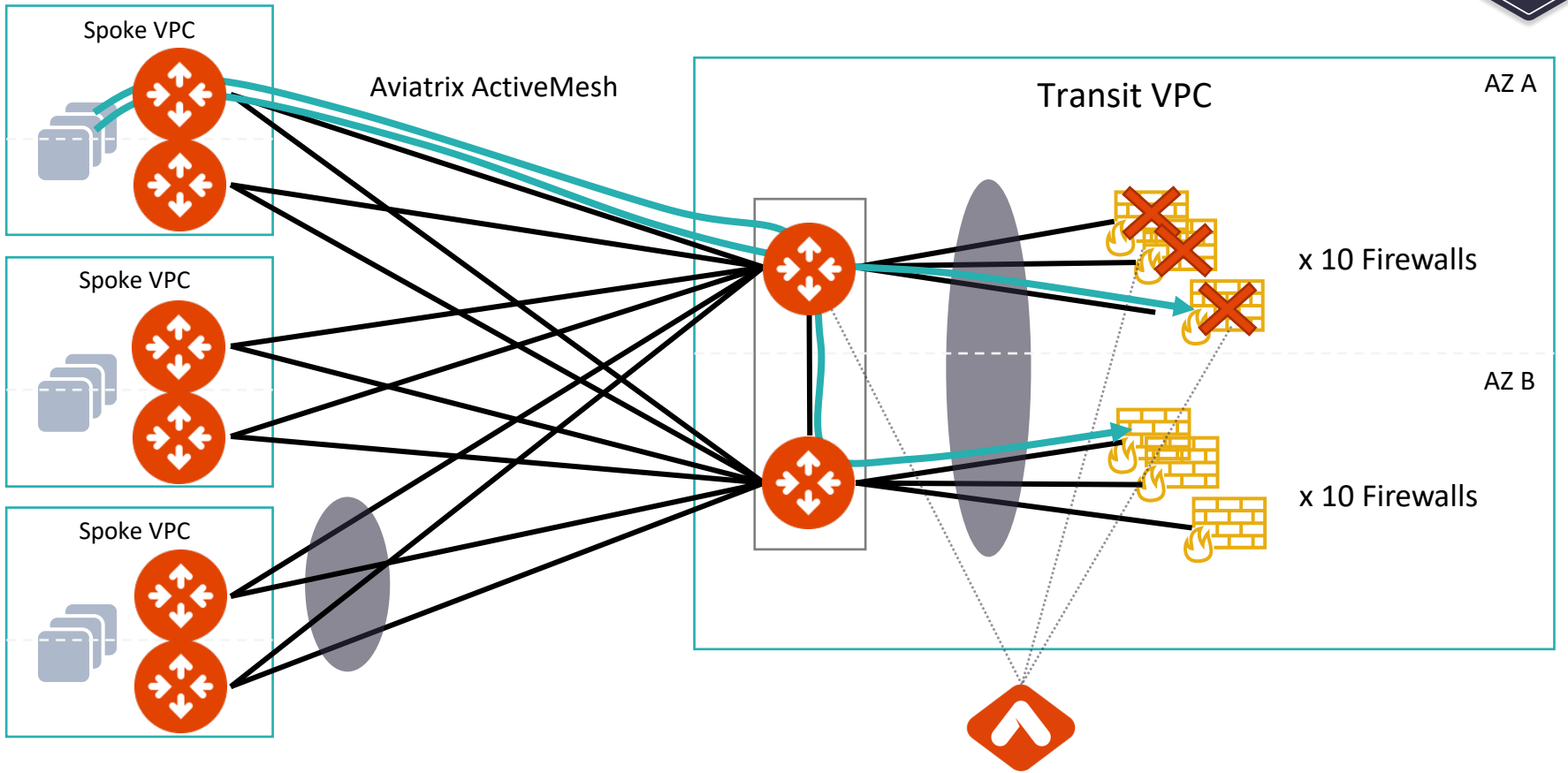
- The Aviatrix Controller monitors the health of the Firewalls
- Controller periodically checks Firewall instance health
- Session stickiness is maintained
  - Existing sessions on working firewalls are not disturbed
  - AKA resilient hashing



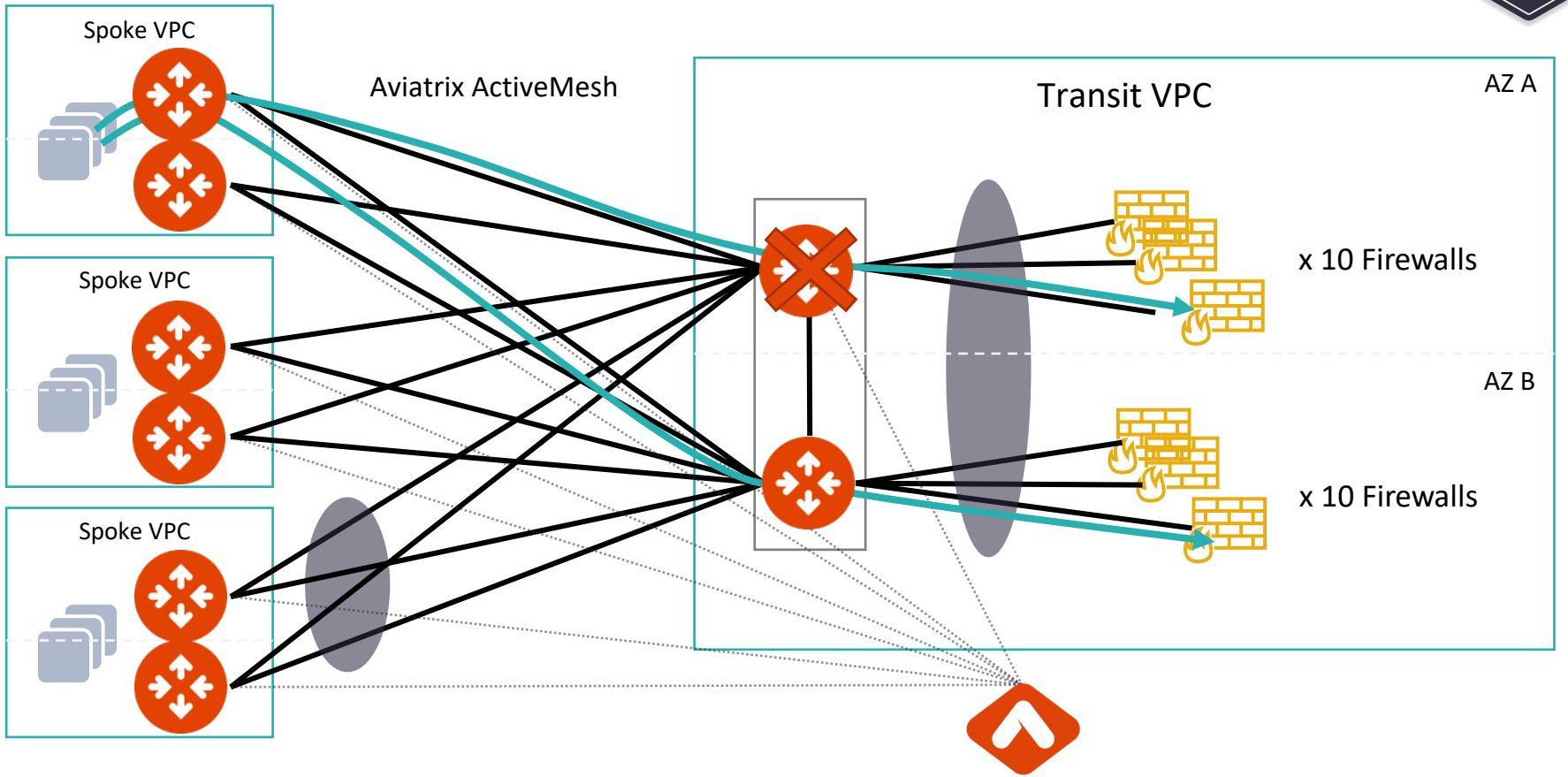
Aviatrix Transit FireNet Failover



Aviatrix Transit FireNet Failover

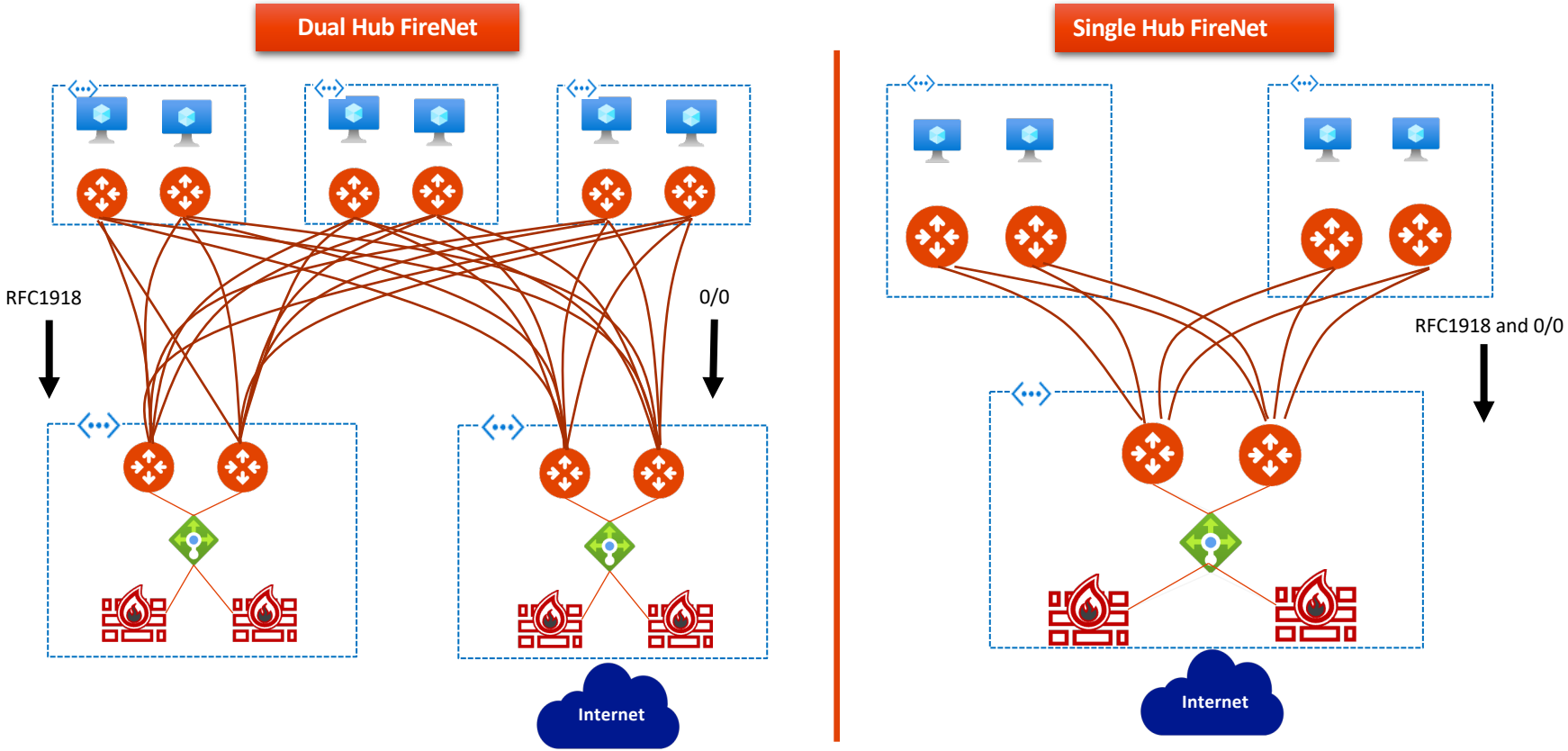


Aviatrix Transit FireNet Failover



FireNet Architecture Options (Azure Example)

Each firewall set can scale independently based on need

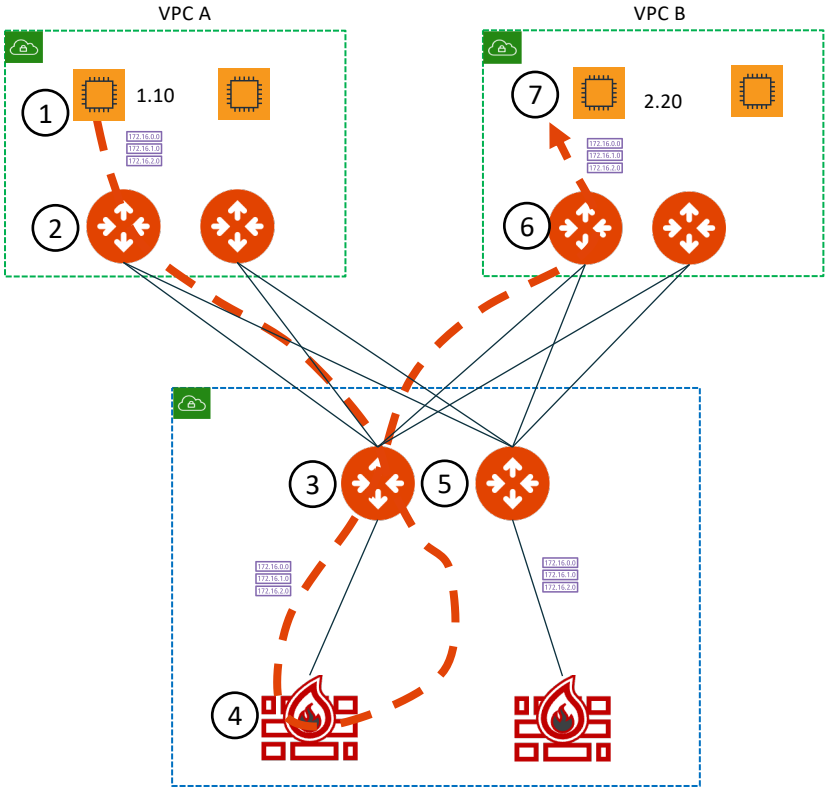


Aviatrix Transit FireNet Packet Walk

FireNet Packet Walkthrough – AWS Example

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

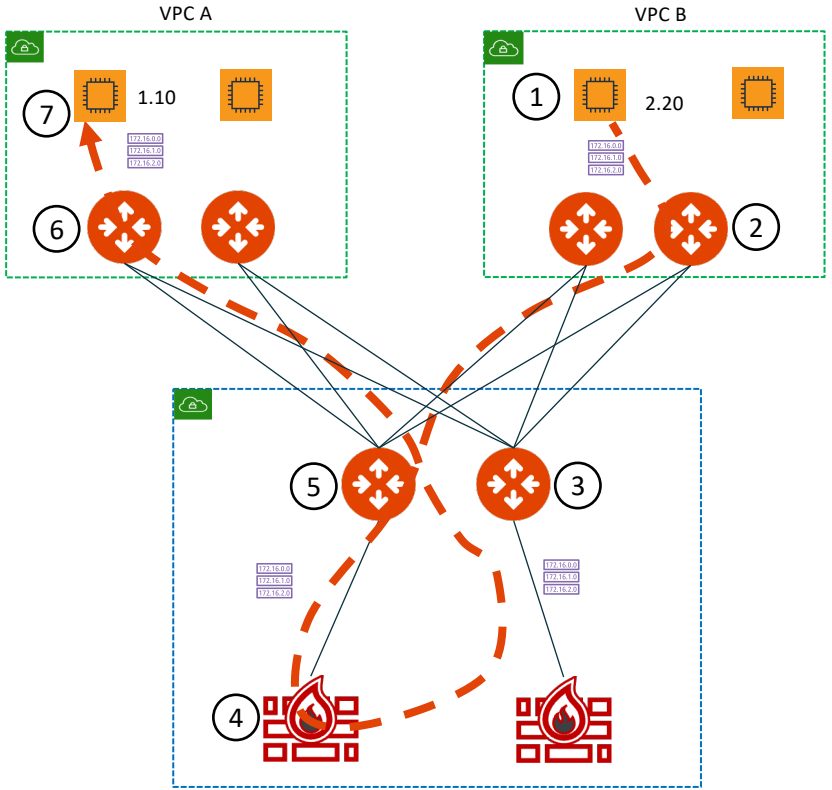
1. The local route table for 1.10 has RFC1918 routes pointed to its local gateway
2. The local Aviatrix spoke gateway will ECMP traffic with 5-tuple hash to one of the Aviatrix Transit Gateways
3. The Aviatrix Transit Gateway receiving the flow will check PBR rules to determine if either source or destination requires FireNet. If a match, traffic is redirected to the one of the available FWs (it can be in the same AZ or a different AZ – when it's in a different AZ, Transit GW sends the traffic first to the other Transit GW).
4. The Firewall selected will process the packet and send the traffic back to its local Transit Gateway.
5. The Aviatrix Transit Gateway will receive the processed packet and PBR this traffic back into the egress interface and ECMP traffic with 5-tuple hash towards the destination spokes.
6. The 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.



FireNet Packet Walkthrough – 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 (directly or via another Transit GW).
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.



Next: Lab 6 - FireNet