



Site2Cloud (S2C) and Edge

ACE Solutions Architecture Team

Agenda

Site2Cloud Overview

Site2Cloud Use Cases

1. High Speed DC Connectivity with Backup VPN
2. Shared Services Multi-Tenant Architecture (aka SaaS Provider)
3. Overlapping IP Space Scenarios

Other Services to Connect to External Networks

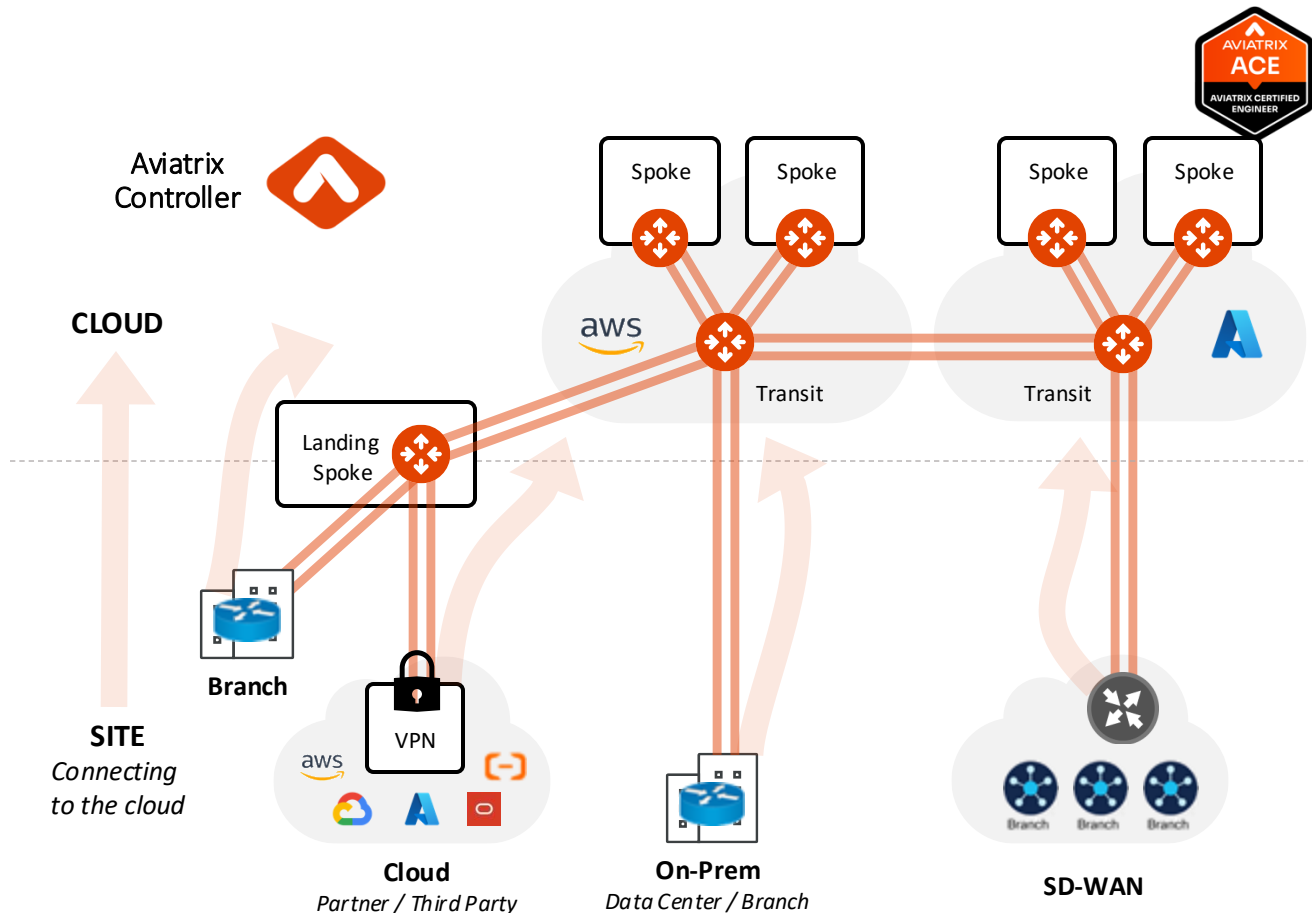
SD-WAN Integration



Overview

What is Site2Cloud?

- Connection from Public Cloud to to:
 - On-Prem DC
 - 3rd Party Appliances, SD-WAN
 - Branch
 - Clouds Native Constructs (VPCs/VNets/VCNs)



Site2Cloud Landing Options

1. Transit Gateway

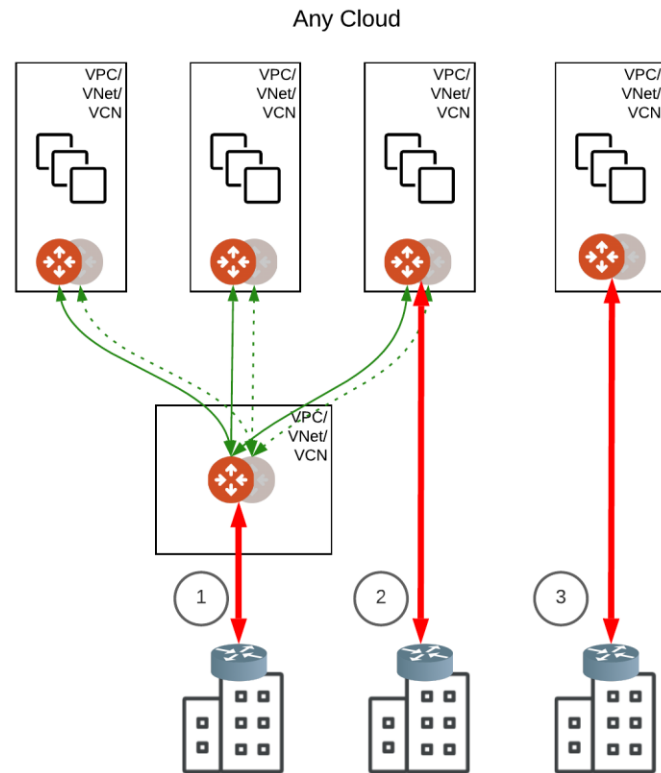
- Route redistribution to other connected networks (automatic or upon approval)
- Basic NAT support
- BGP support
- Segmentation support for external connections
- Active/Active or Active/Standby

2. Spoke Gateway

- Option to easily redistribute routes to other networks
- Advanced NAT support (Mapped NAT)
- BGP supported as of 6.6
- Active/Standby or Active/Active

3. "Standalone" Gateway (with Second Gateway)

- Advanced NAT support
- No support for BGP
- Active/Active or Active/Standby



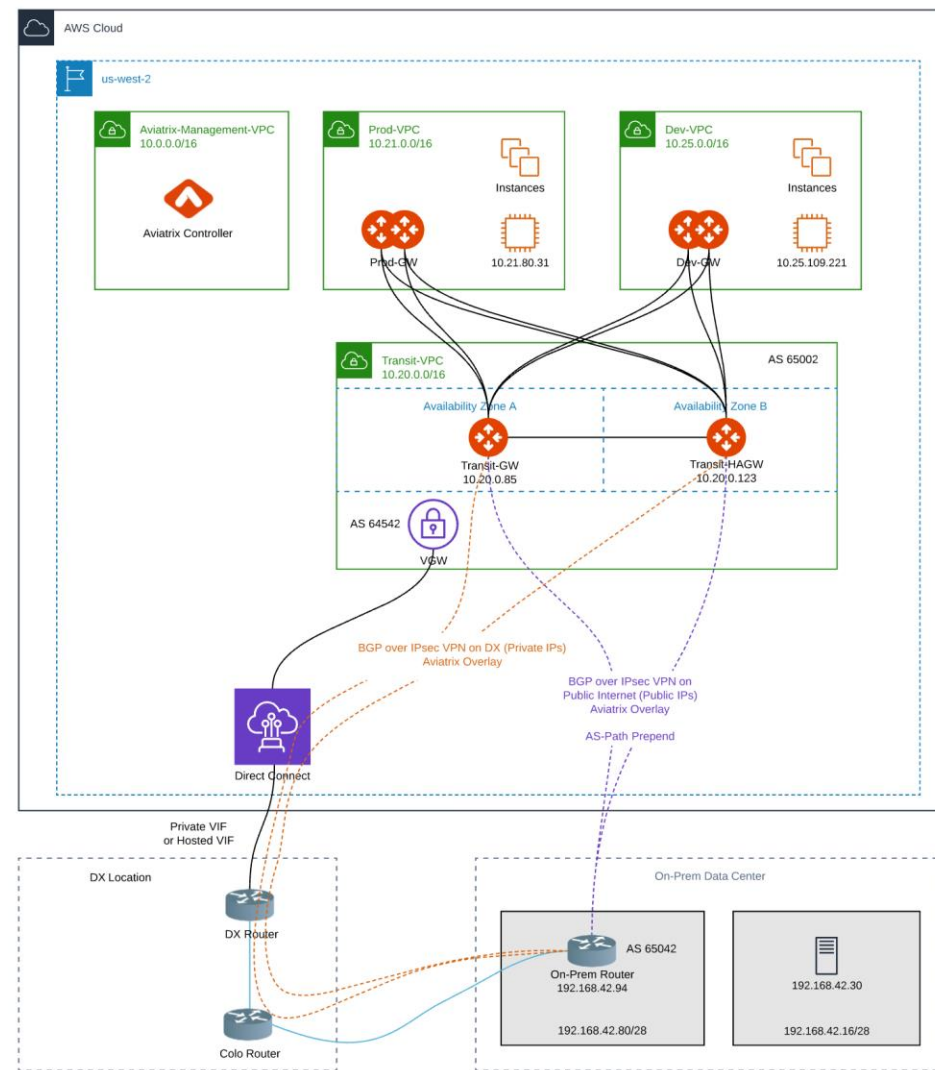


Use Cases

High Speed DC Connectivity with Backup VPN

High Speed DC Connectivity with Backup VPN

- Connecting on-prem data centers to the cloud via route-based Site2Cloud + BGP control plane, landing on Transit gateways
- Primary Site2Cloud is using private IPs to leverage the DX underlay
- Backup Site2Cloud is using public IPs to use the public Internet as underlay
- On both connections, ECMP can be enabled for Active/Active high performance or disabled (typically if on-prem has stateful firewalls)
- On-prem router is performing AS-path prepend on VPN routes advertised to Aviatrix transit over the VPN connection, to force Transit gateways to send traffic via the DX connection
- Additionally, on-prem router would use Weight or Local Pref, etc., to send traffic to the DX connection
- If DX connection goes down, traffic would automatically failover to Backup connection
- Branch connectivity is following a similar BGP-based Site2Cloud to Transit gateways, but it is typically only via VPN over the public Internet

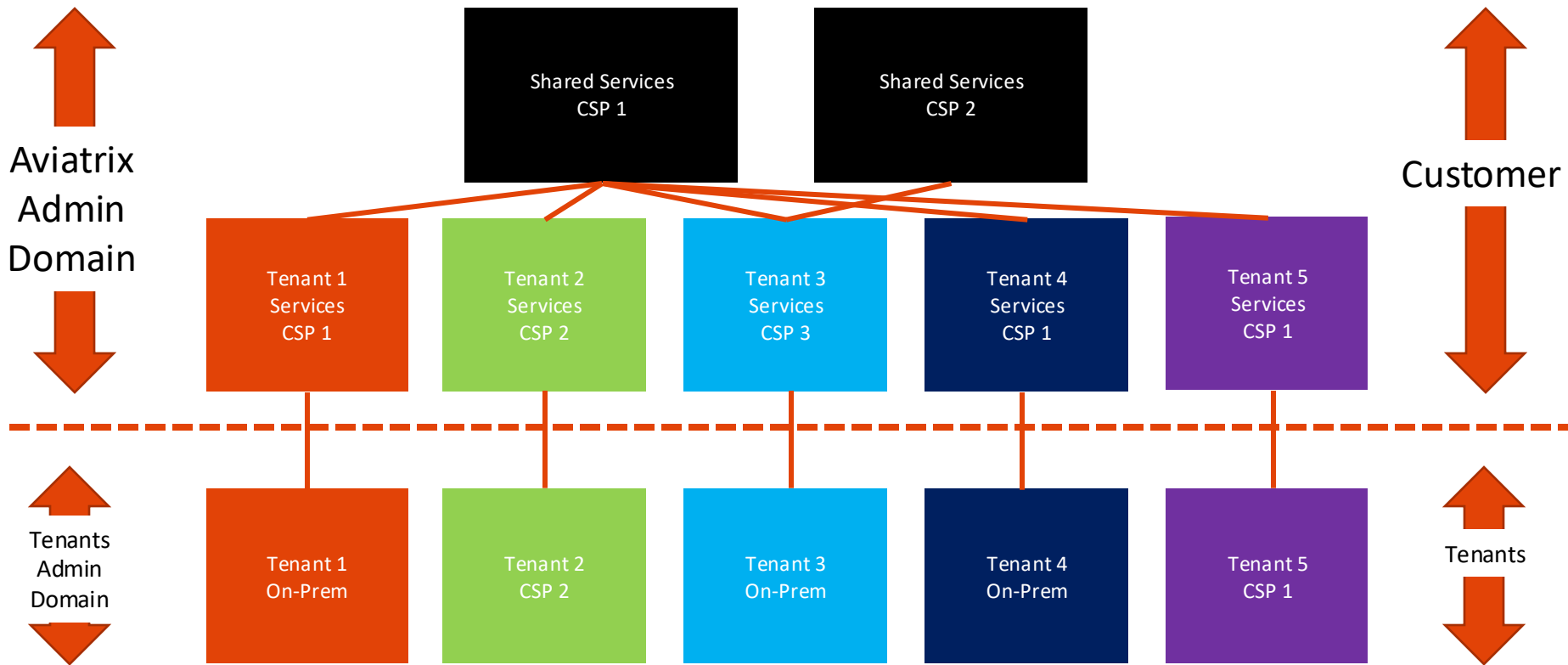




Use Cases

Shared Services Multi-Tenant Architecture
(aka SaaS Provider)

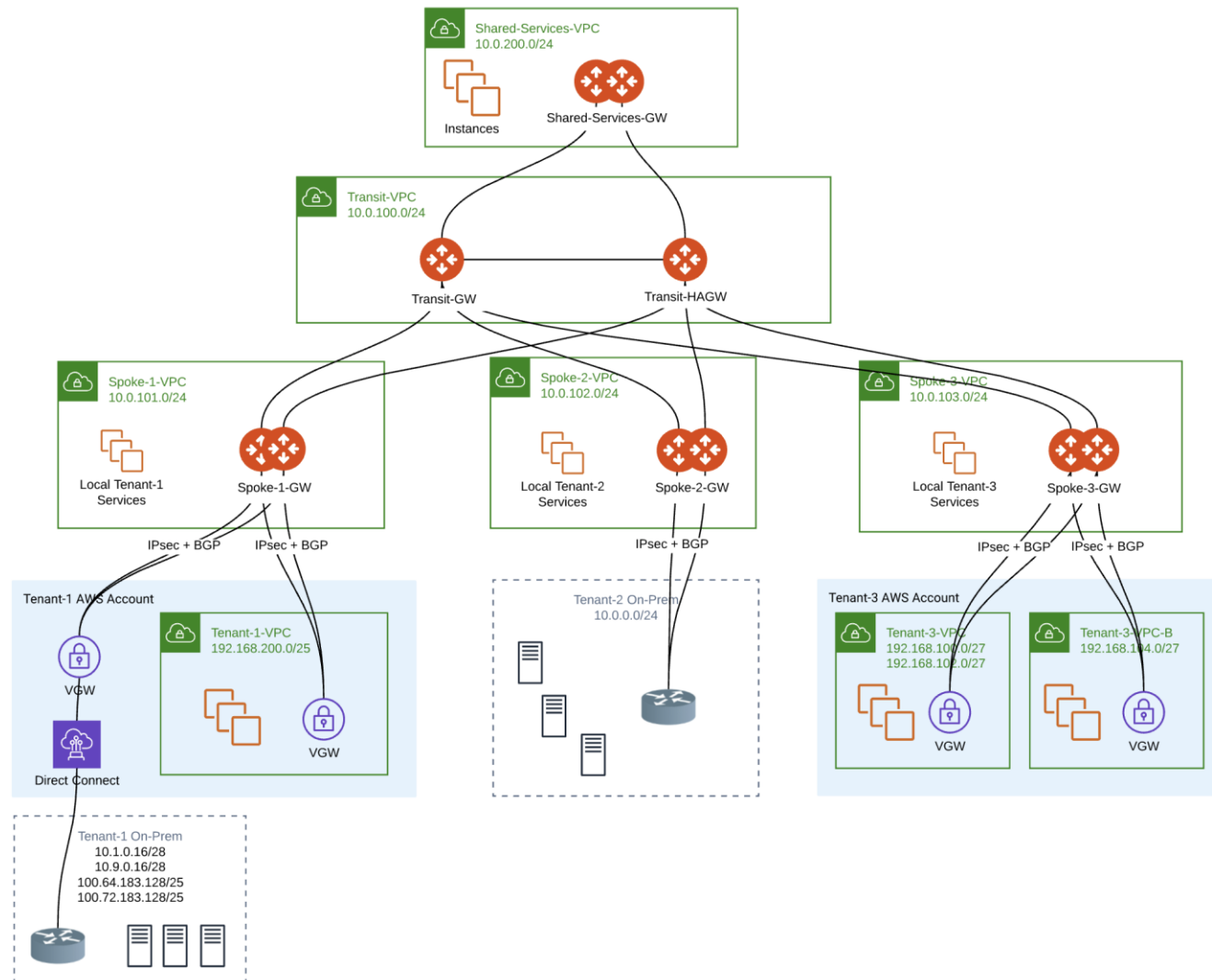
SaaS High-Level Architecture



Requirements and Solution

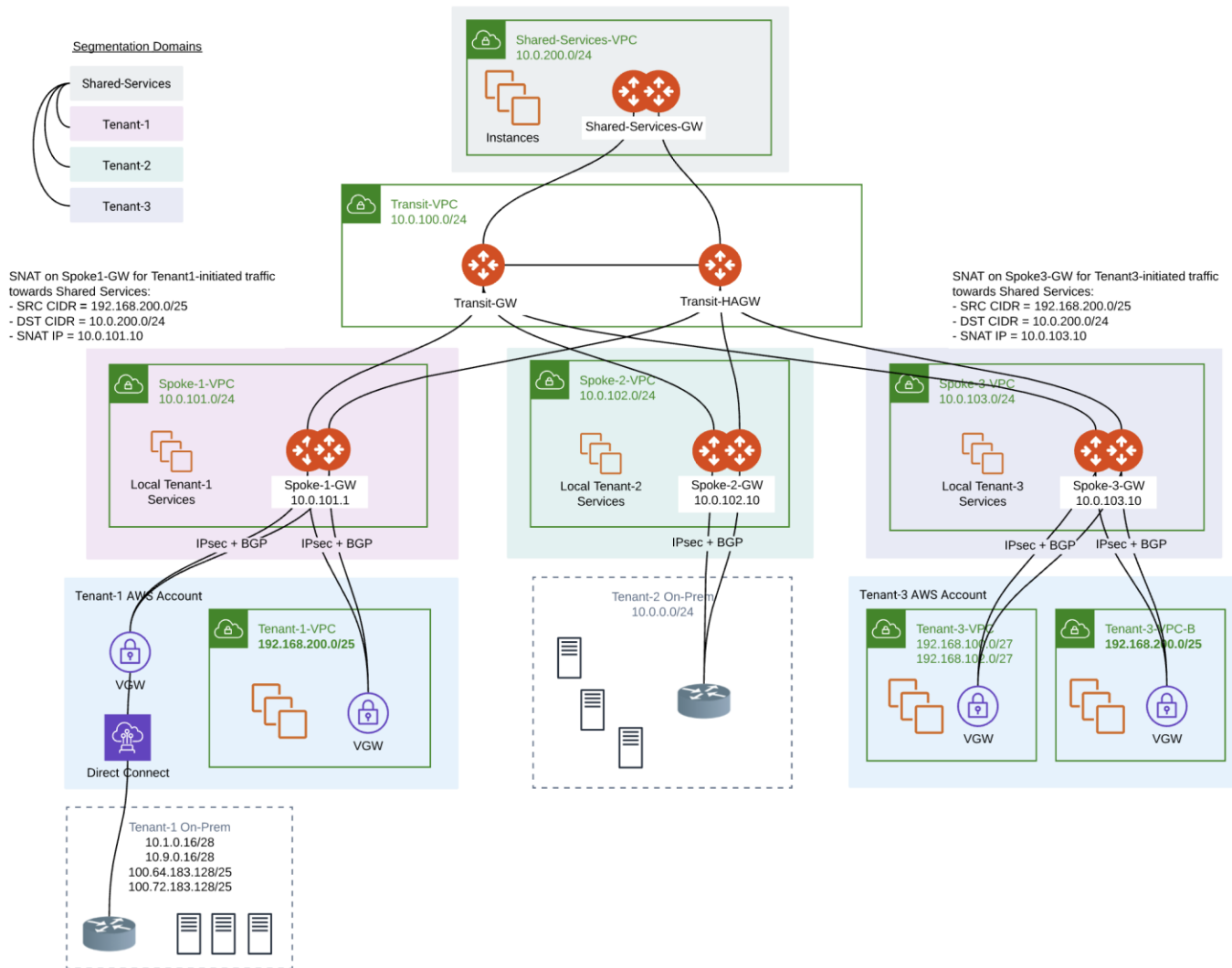
1. Connect a large number of tenants (1000+)
 - Distribute the tenants across Spoke gateways, for horizontal scaling and blast radius minimization
2. Provide both dedicated tenant services, and shared services
 - Host shared services in common Spoke VPCs
 - Host dedicated services in tenant-specific Spoke VPCs
3. Onboard the tenants with BGP: dynamic control plane that fits their operational model
 - Terminate BGP on the tenant Spoke gateways
4. Handle overlapping IPs across tenants, and between tenants and shared services
 - Use NAT on the tenant Spoke gateways
5. Maintain isolation across tenants
 - Use segmentation domains on the tenant Spoke gateways
6. Provide the highest throughput to tenant services
 - Horizontal scaling
 - Tenant services are directly hosted in the Spoke VPC where BGP terminates
 - They're directly accessed by tenants, without the Transit layer being a bottleneck

Typical Architecture



Segmentation and NAT Support

- SaaS Providers Aviatrix
Validated Design
<https://aviatrix.com/resources/design-guides/aviatrix-validated-design-saas-providers-infrastructure>



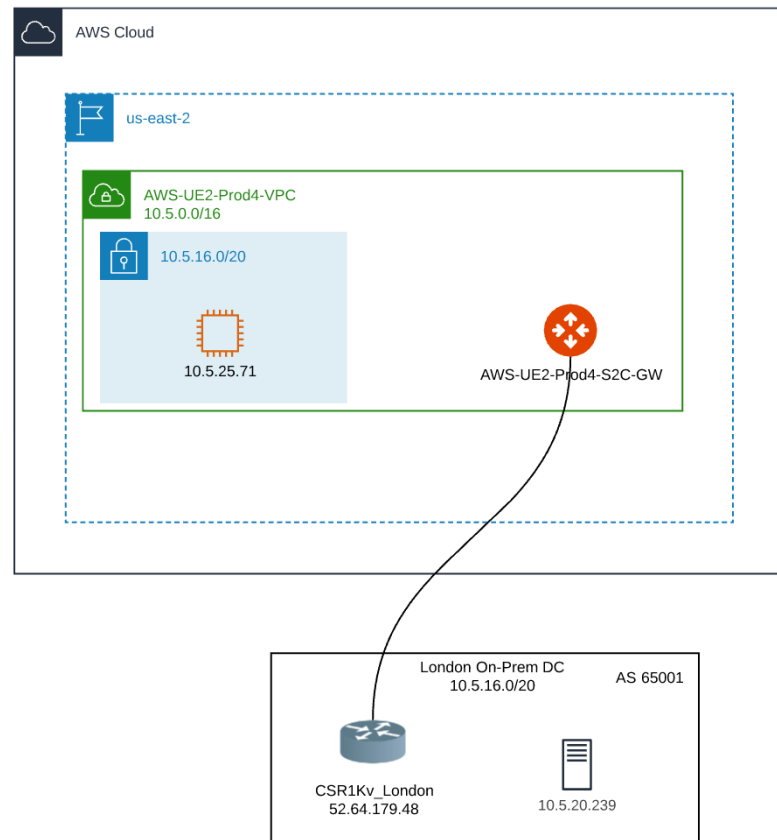


Use Cases

Overlapping IP Space Scenarios

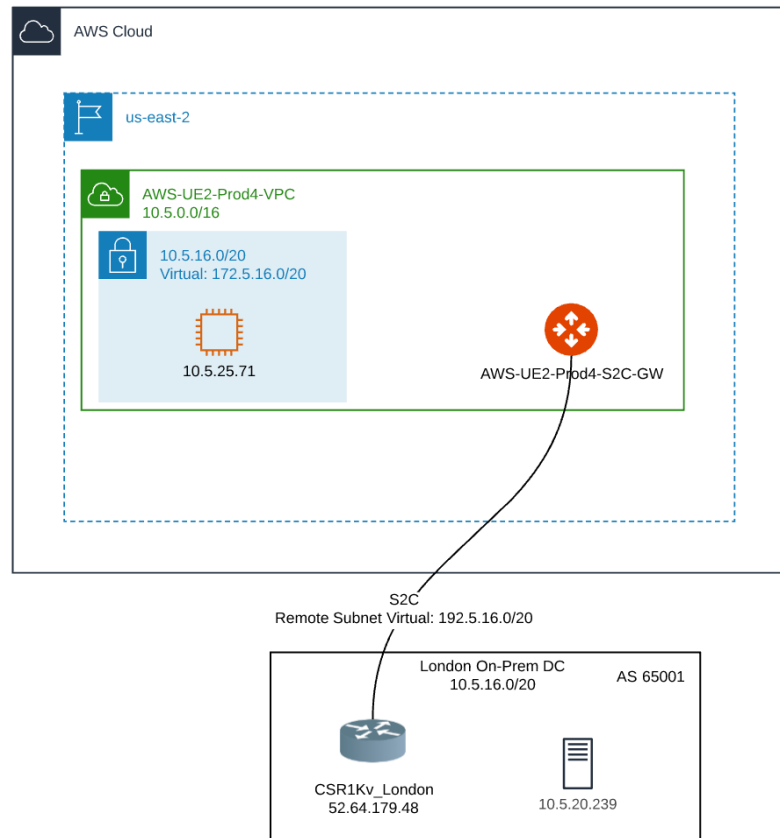
Requirements

- Need to connect overlapping networks between the cloud and on-prem
- Don't want the on-prem router to implement any NAT
 - Keep it simple with no on-prem dependency
 - Many on-prem routers have no NAT, or very limited NAT
- The host information must be preserved
 - No NAT overload requirement anywhere
- The configuration must be simple and scalable



Solution – Mapped NAT with Route-Based Site2Cloud

- **Virtual subnets**, which are defined to be unique (not necessarily RFC1918), are used for communication between overlapping VPC and on-prem
- The Site2Cloud Gateway **NATs between real subnets and virtual subnets**, while **preserving the host information** in the IP
- There is **no need for any on-prem NAT** operations
- The configuration is extremely **simple**, and it does not require individual /32 NAT rules
- It works with both **Route-based** and **Policy-based IPsec**



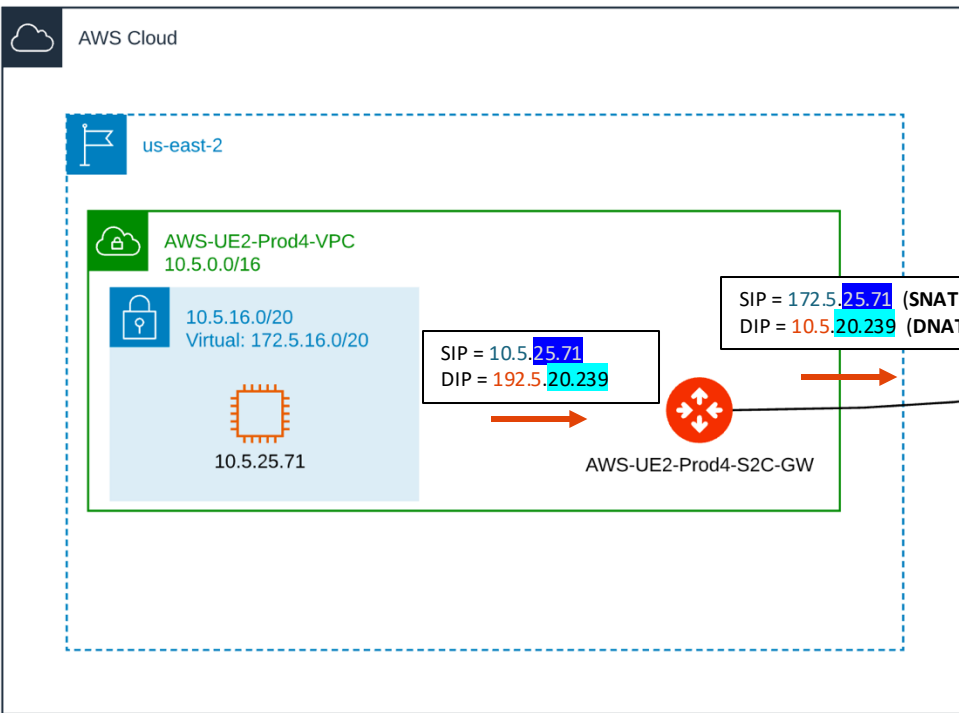
Packet Walk

Remote Subnet (Real) 10.5.16.0/20

Remote Subnet (Virtual) 192.5.16.0/20

Local Subnet(Real) 10.5.16.0/20

Local Subnet(Virtual) 172.5.16.0/20



SIP = 172.5.25.71 (no change by on-prem router)
DIP = 10.5.20.239 (no change by on-prem router)

SIP = 172.5.25.71 (SNAT to Local Subnet Virtual by Site2Cloud Gateway)
DIP = 10.5.20.239 (DNAT to Remote Subnet Real by Site2Cloud Gateway)

S2C
Remote Subnet Virtual: 192.5.16.0/20

CSR1Kv_London
52.64.179.48

London On-Prem DC
10.5.16.0/20 AS 65001

10.5.20.239

```
[ec2-user@ip-10-5-20-239 ~]$ sudo tcpdump icmp -n
tcpdump: verbose output suppressed, use -v or -vv for full protocol
listening on eth0, link-type EN10MB (Ethernet), capture size 65535
17:37:51.594514 IP 172.5.25.71 > 10.5.20.239: ICMP echo request, id=172.5.25.71
17:37:51.594542 IP 10.5.20.239 > 172.5.25.71: ICMP echo reply, id=172.5.25.71
```

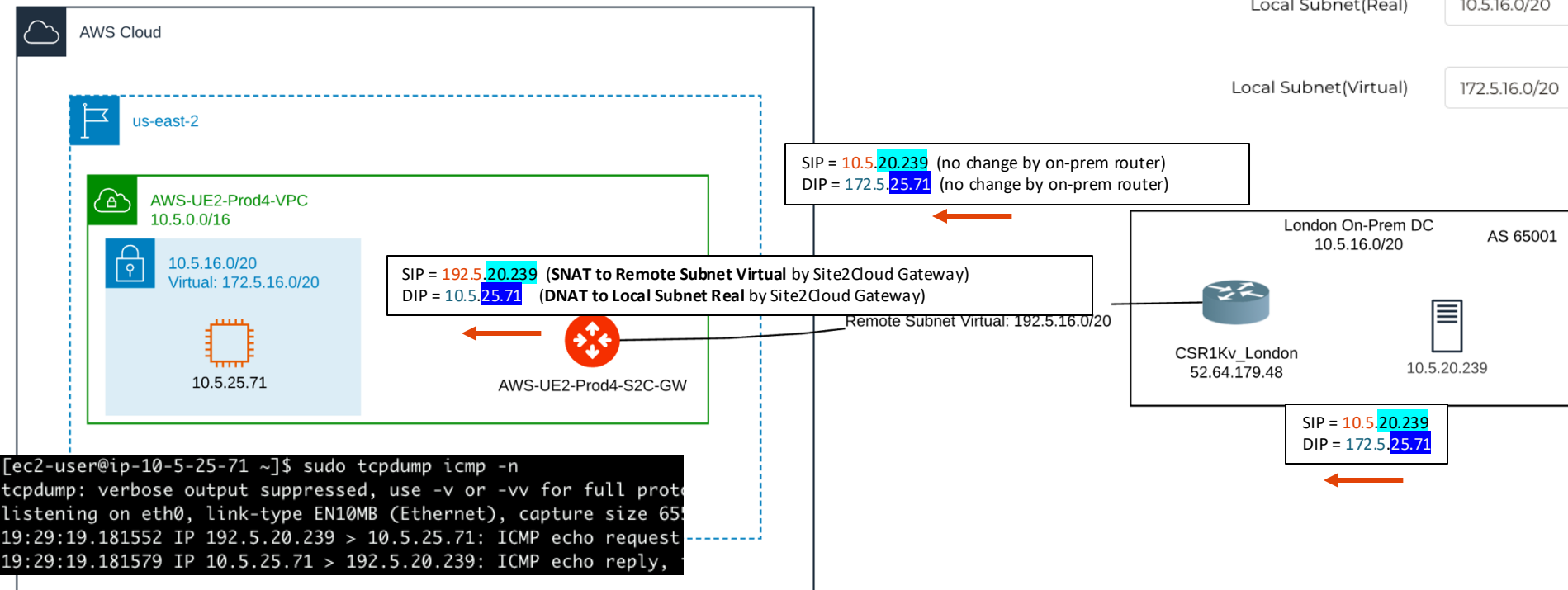
Packet Walk – Return Traffic

Remote Subnet (Real) 10.5.16.0/20

Remote Subnet (Virtual) 192.5.16.0/20

Local Subnet(Real) 10.5.16.0/20

Local Subnet(Virtual) 172.5.16.0/20





Download the External Connection
Configuration

Automatic External Connection Template

A **remote site configuration template** can be generated from the CoPilot.

- This template file contains the *gateway public IP address, VPC/VNet CIDR, pre-shared secret and encryption algorithm*.
- You can import the information to your remote router/firewall configuration.

Vendor:

Platform:

- Aviatrrix → UCC
- Cisco → ASA 5500 Series / ISR, ASR or CSR
- Generic → Generic

Download Configuration

Vendor
Aviatrrix

Platform
UCC

Software
1.0

Cancel Download

Download Configuration

Vendor
Cisco

Platform
ISR, ASR, or CSR

Software
IOS(XE)

Cancel Download

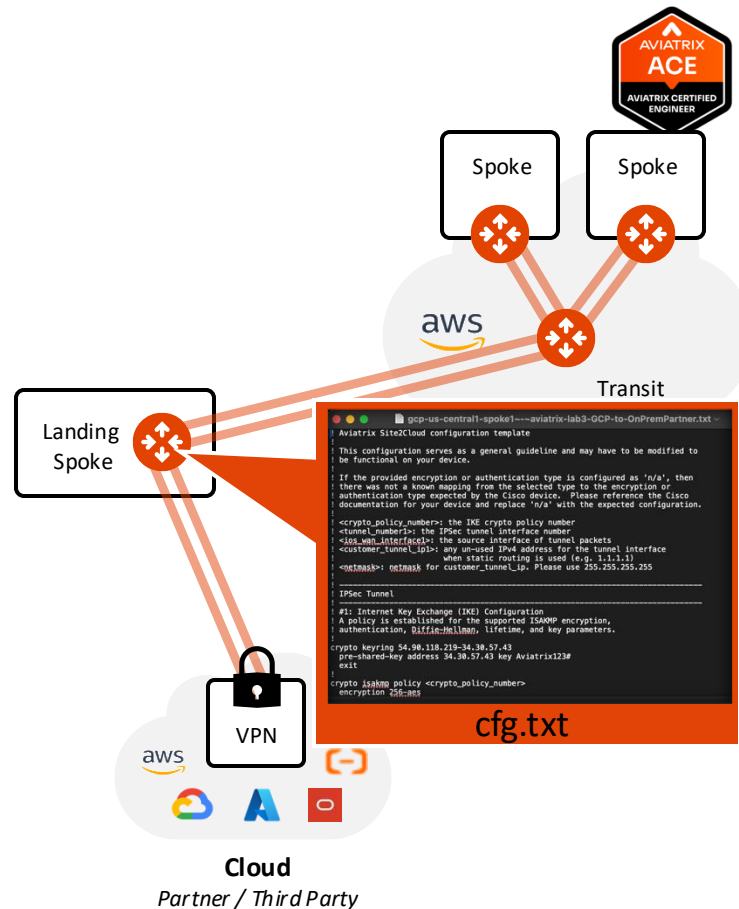
Download Configuration

Vendor
Generic

Platform
Generic

Software
Vendor independent

Cancel Download

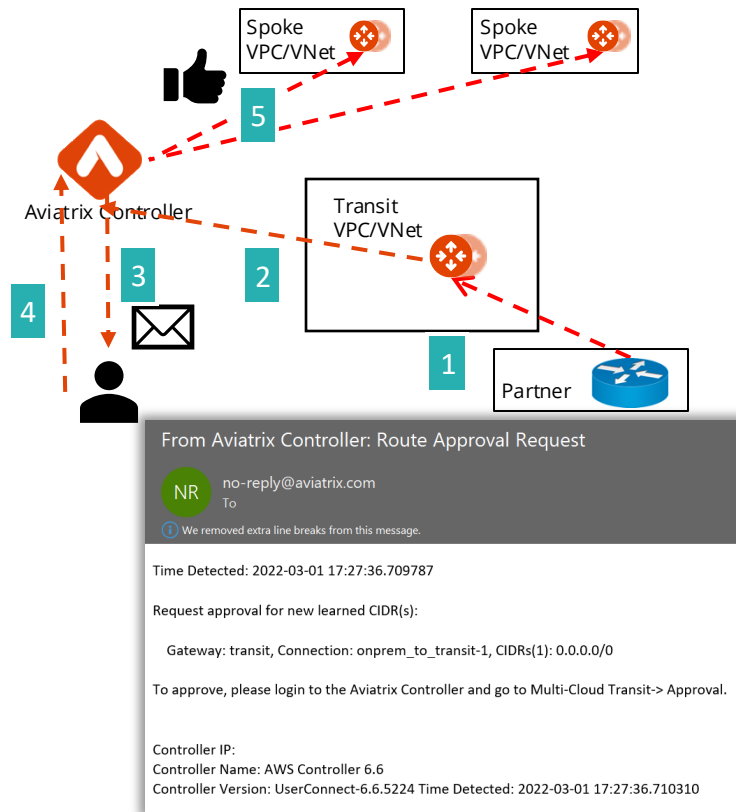




Route Approval

BGP Route Approval

- Can explicitly approve any BGP-learned route from Partner or on-prem into the cloud network
 - Prevents unwanted advertisement of routes such as 0/0 from Partner
1. New routes arrive at Transit Gateway
 2. Transit Gateway reports new routes to Controller
 3. Controller notifies admin via email
 4. Admin logs in to Controller to approve
 5. If approved, Controller programs the new routes to Spoke VPCs
- **Note:**
 - Route Approval completely blocks a BGP prefix to even be considered by control plane
 - Prefixes blocked are not even programmed in the Gateway route table





Aviatrix Edge

Introducing Aviatrix Edge

The only multi-cloud native platform with enterprise-grade visibility and control for public cloud and the edge
Aviatrix software in multiple form factors providing consistent network, security, and visibility to the edge.
Edge locations appear and behave as another VPC/VNET with spoke and transit capabilities.



Cloud Out Architecture



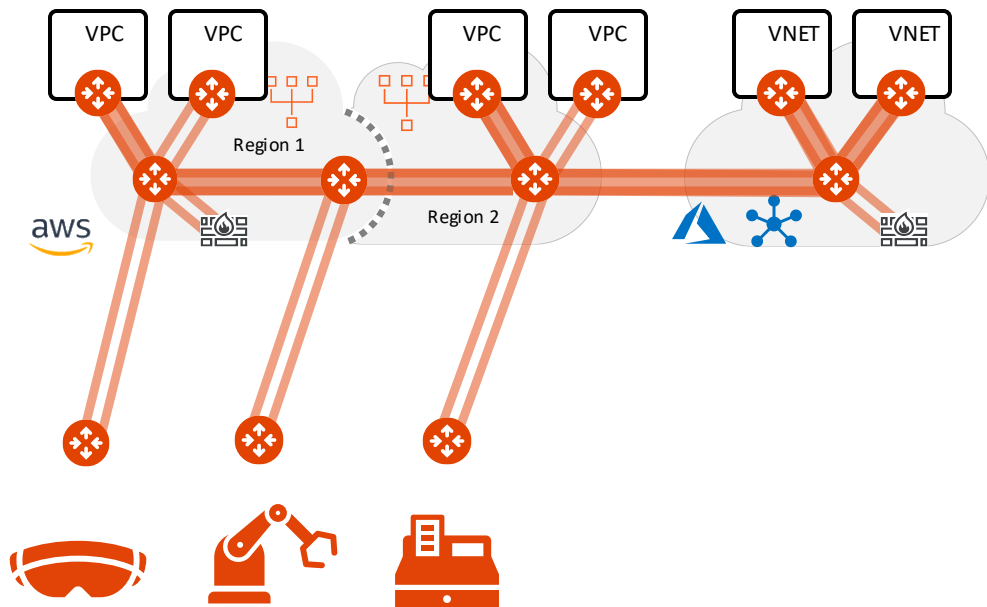
Simplified Edge Management



Consistent Secure Edge



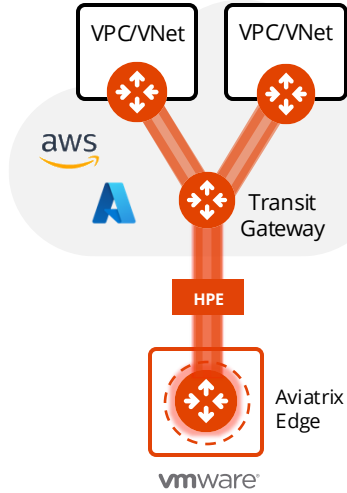
Simplified Edge On-boarding



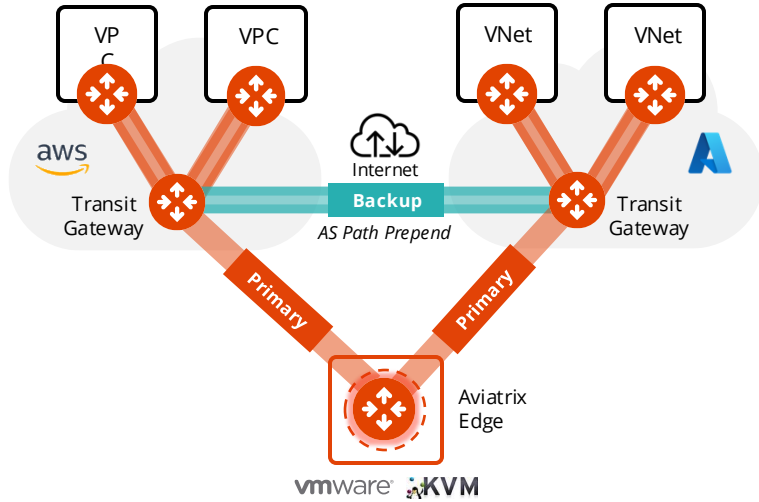
Aviatrix Edge Use Cases



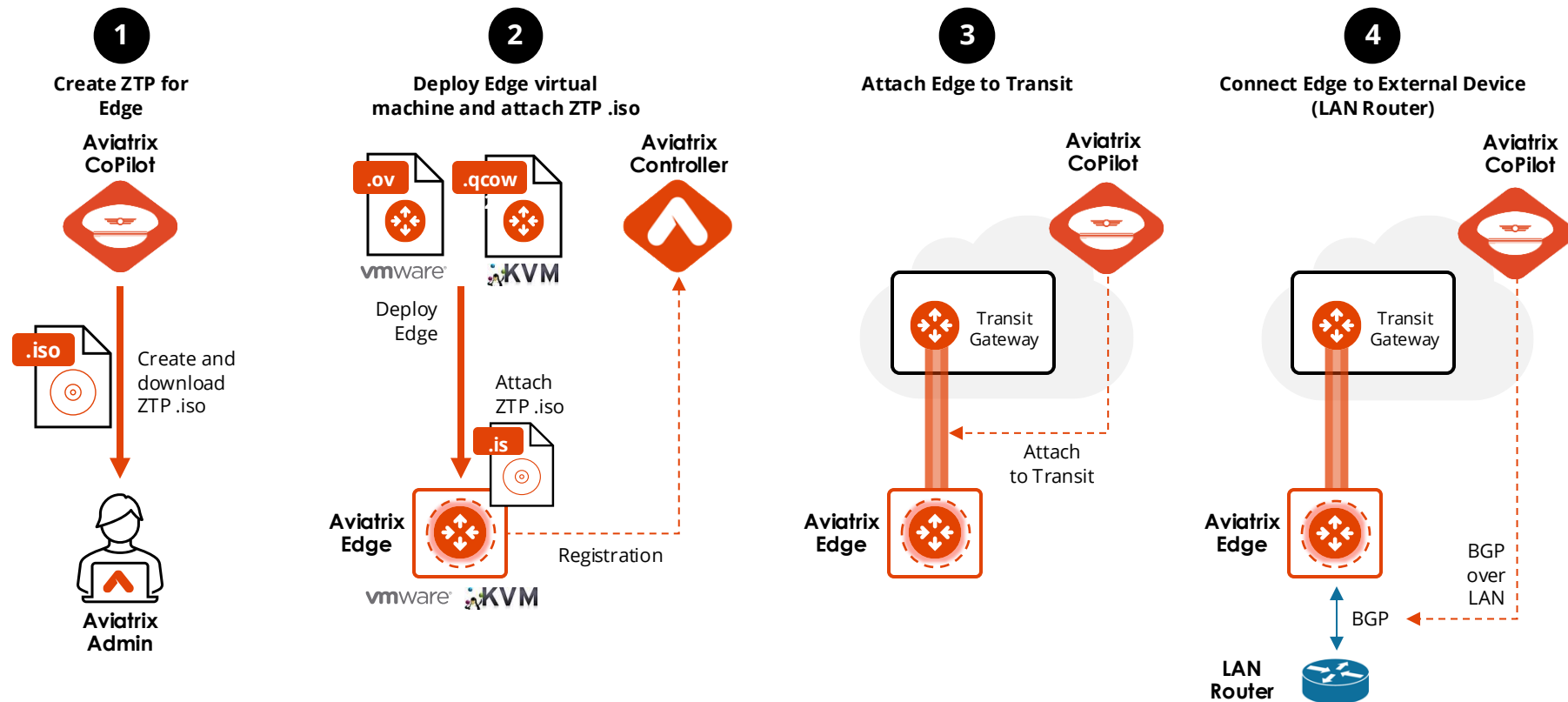
Extend the Aviatrix Platform to the Edge



Multi-Cloud Connectivity via Aviatrix Edge



Edge 2.0 Deployment Workflow

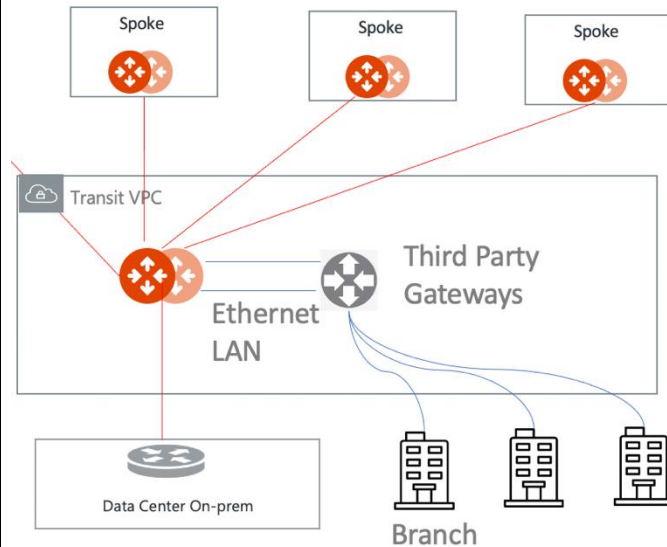
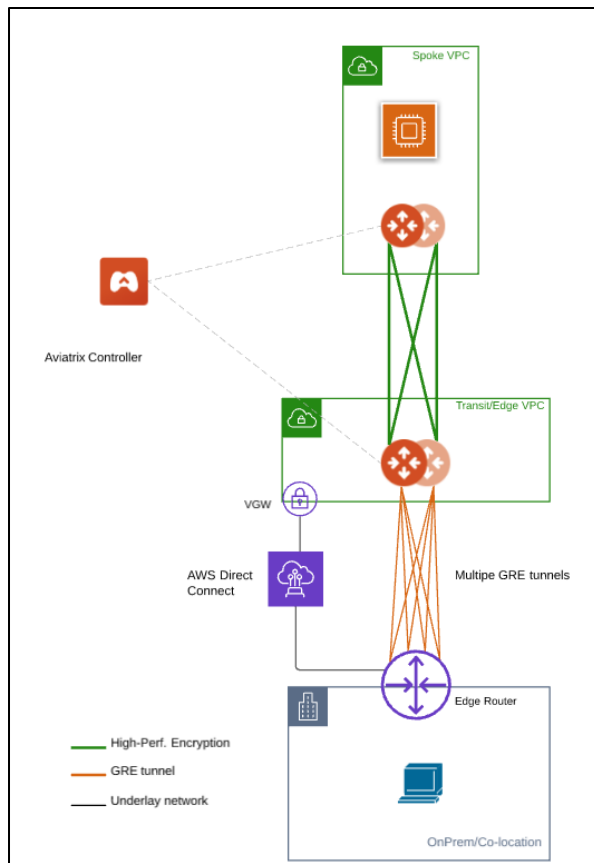




Other Services to Connect to External Networks

Connections to External Device

- **IPsec** (discussed already)
- **BGP over GRE** (AWS only)
 - Extends Aviatrix overlay to external networks without encryption, and without IPsec speed limitations
 - Useful for AWS DX
- **BGP over LAN**
 - Route exchange without any tunneling protocol
 - High-performance, widely compatible SD-WAN integration
 - Integrates with GCP Network Connectivity Center (NCC)



Configuration – CoPilot > Networking > Connectivity > + External Connection



Create External Connection to External Device

Name

Connect Using

☒ BGP ☐ Static-Route Based ☐ Static-Policy Based

Type

IPsec

IPsec

GRE

LAN

Run BGP over an IPsec connection from a Transit or BGP Spoke Gateway.

Local Gateway

IPsec Configuration

Attach Over

Private Network

Algorithms

☒ Default ☐ Custom

Internet Key Exchange

☒ IKEv1 ☐ IKEv2

BGP Configuration

Local ASN

Learned CIDR Approval

☐ Off

Tunnel Configuration (ActiveMesh)

+ Remote Device

Remote Device 1 IP

Remote ASN

BGP Local IP

BGP Neighbor IP

Pre-Shared Key

Cancel

Save



SD-WAN Integration

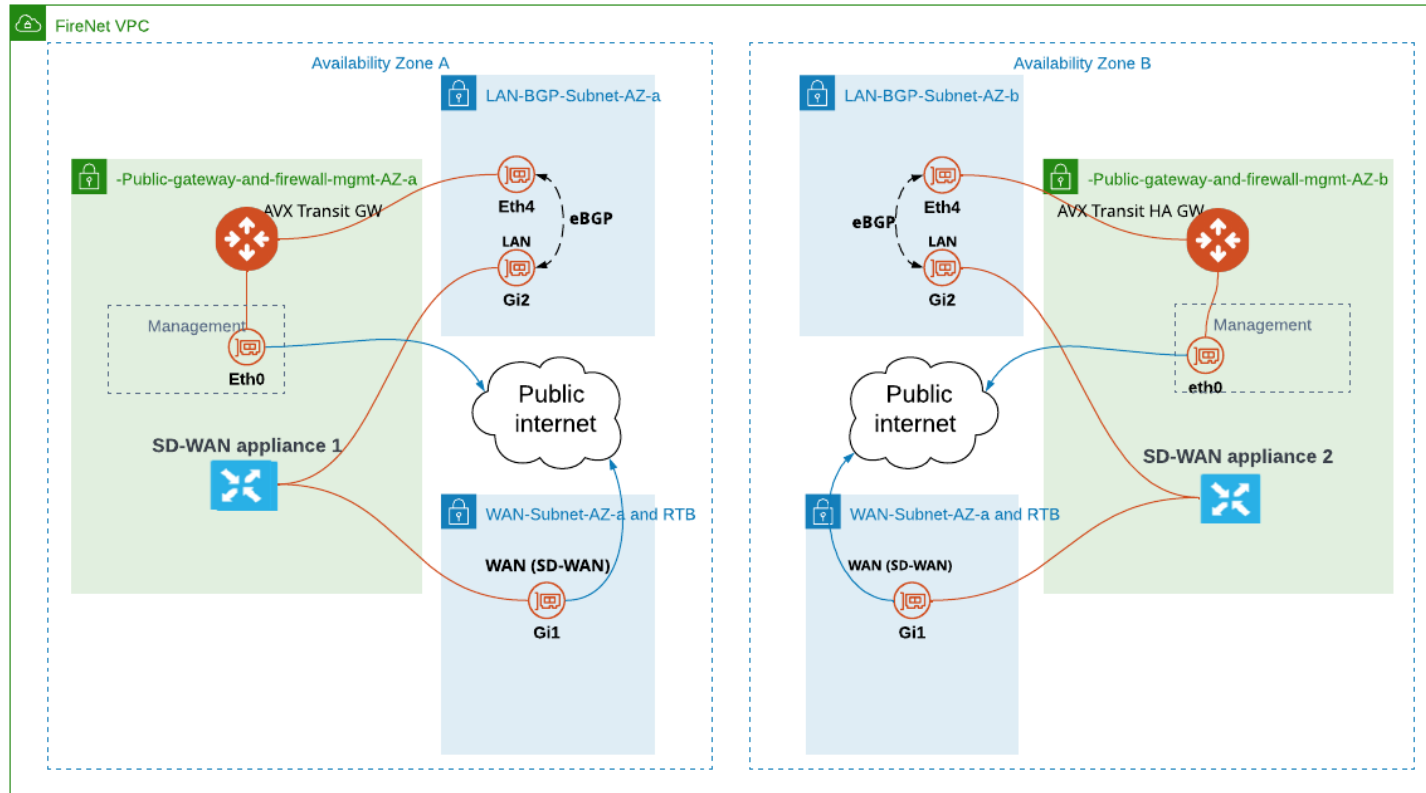
Solution – SD-WAN integration with Aviatrix



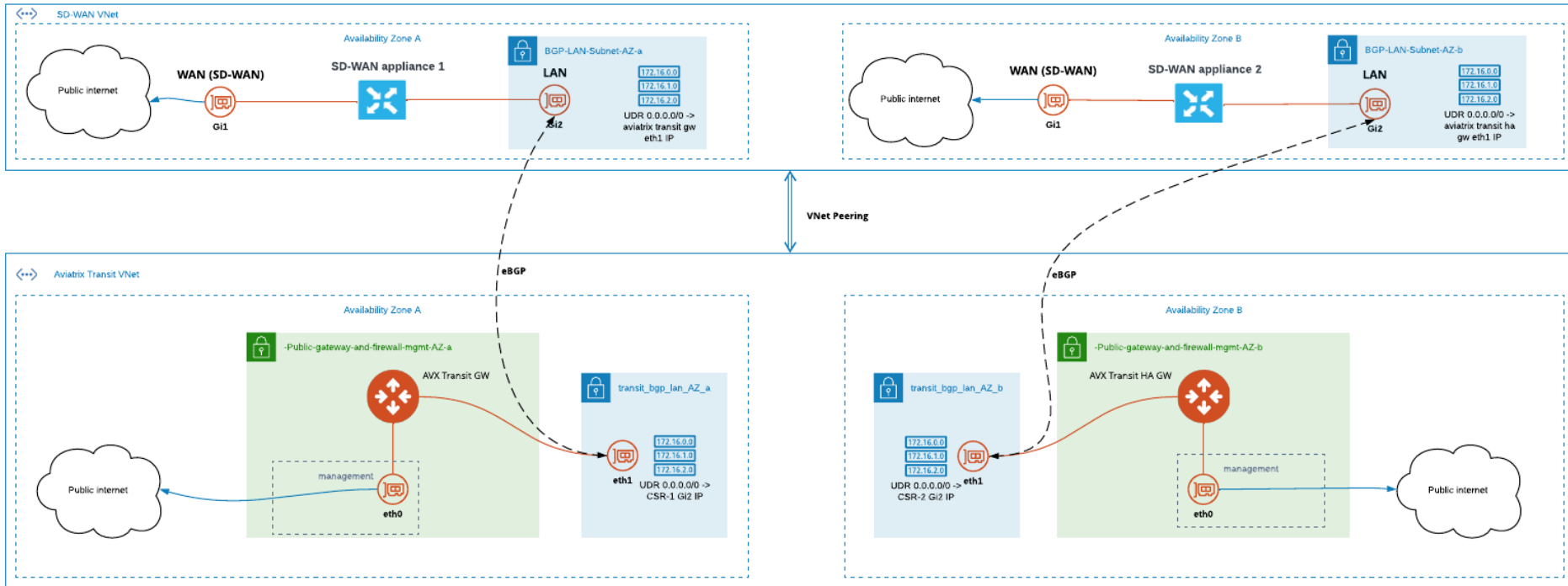
- BGP based integration with SD-WAN cloud instances
 - BGP over IPsec
 - BGP over LAN
 - BGP over GRE
- Service chaining by inspecting traffic with Next Gen Firewalls
- Advanced Traffic Engineering and Filtering options
- All other Aviatrix benefits apply



BGP over LAN in AWS



BGP over LAN in Azure





Next: User VPN