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## Site2Cloud (S2C)

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Solutions Engineering

# Agenda

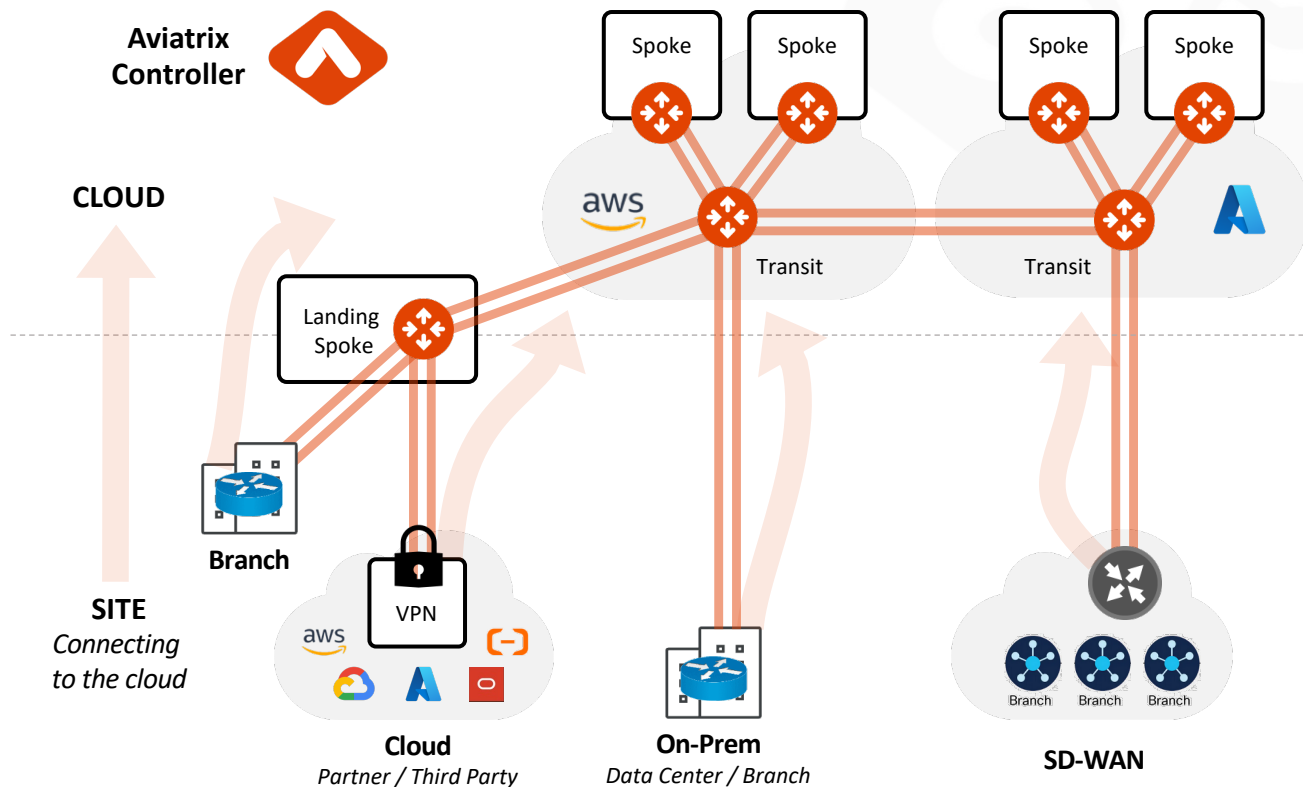
- Site2Cloud Overview
- Site2Cloud Use Cases
  1. High Speed DC Connectivity with Backup VPN
  2. Shared Services Multi-Tenant Architecture (aka SaaS Provider)
  3. Overlapping IP Space Scenarios
- Other Services to Connect to External Networks
- SD-WAN Integration



## Overview

# What is Site2Cloud?

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



# Site2Cloud Landing Options

## 1. Transit Gateway

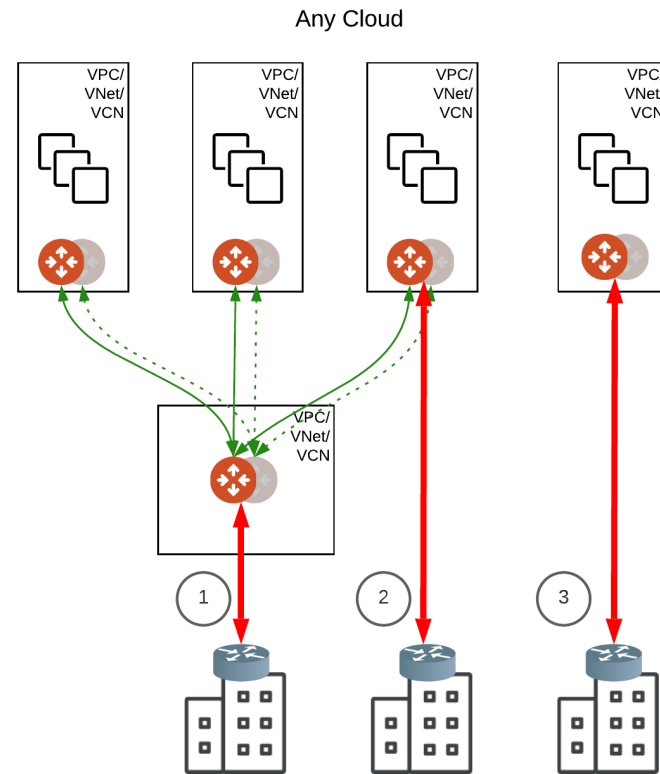
- Route redistribution to other connected networks (automatic or upon approval)
- Basic NAT support
- BGP support
- Segmentation support for external connections
- Active/Active or Active/Standby

## 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



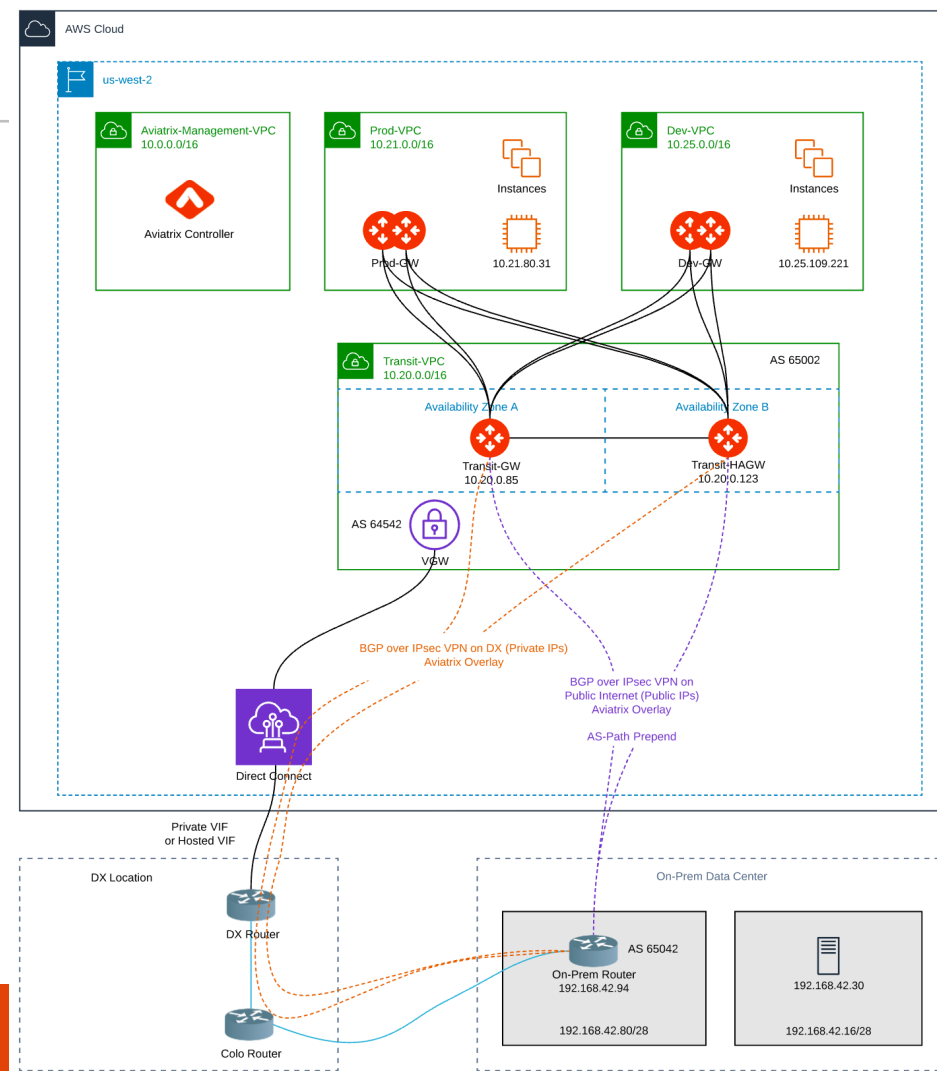


## Use Cases

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



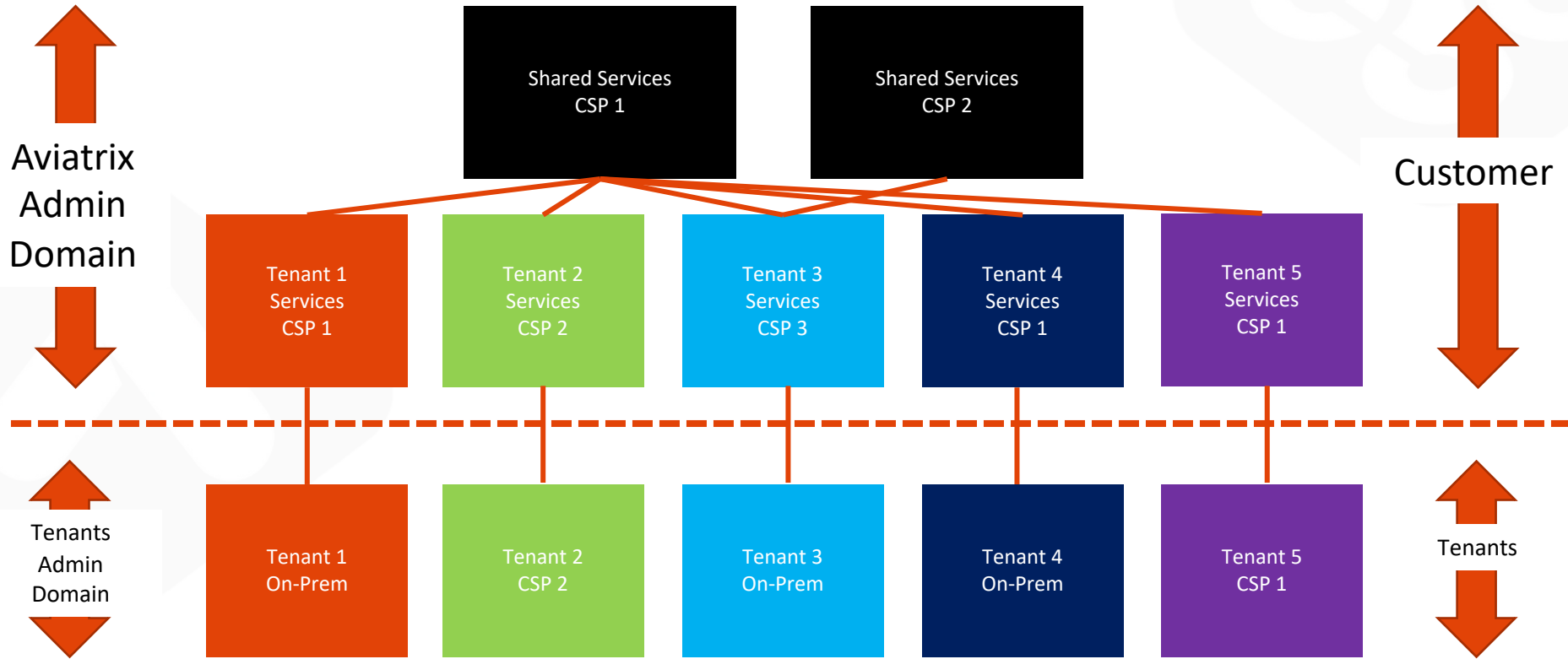


## Use Cases

Shared Services Multi-Tenant Architecture  
(aka SaaS Provider)



# SaaS High-Level Architecture

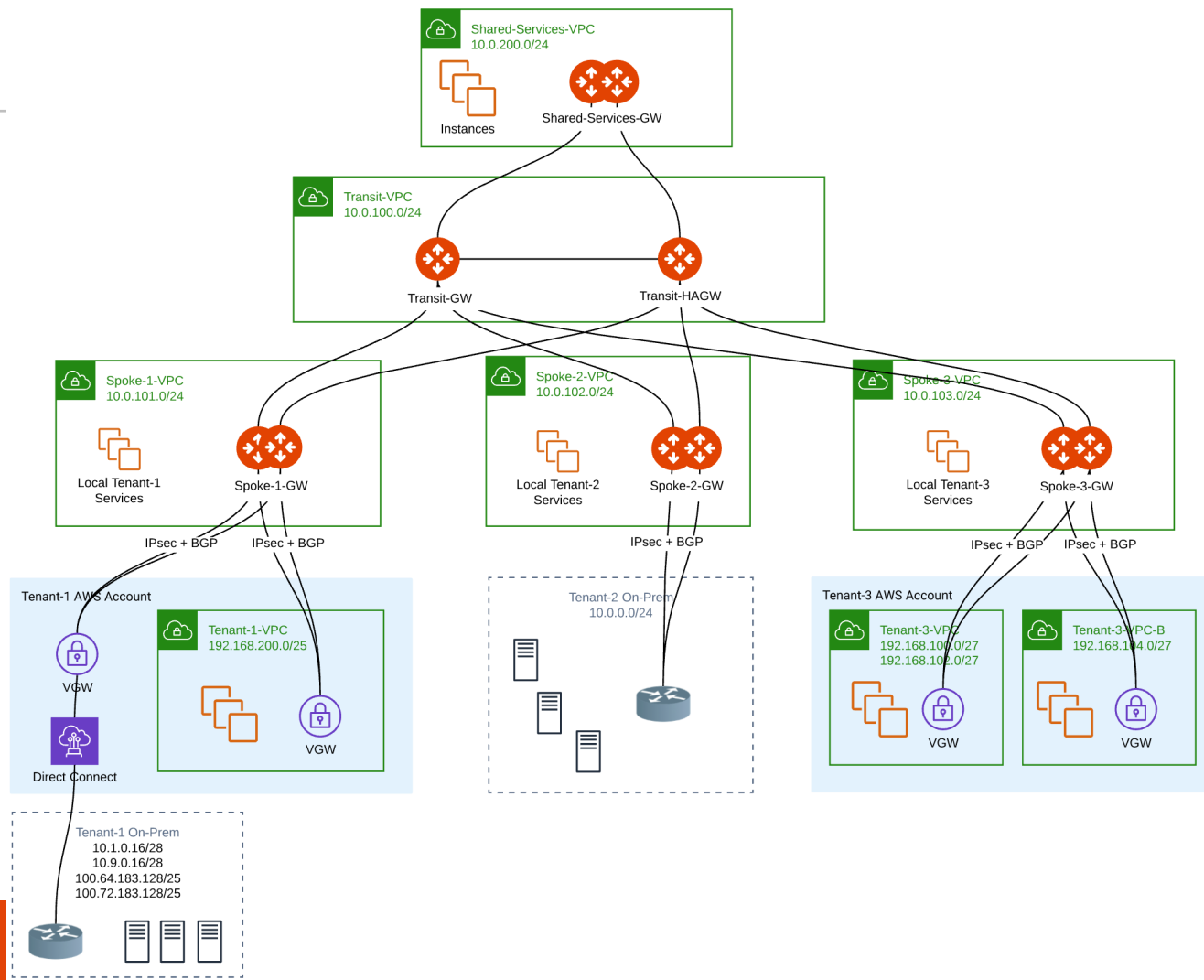


## Requirements and Solution

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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

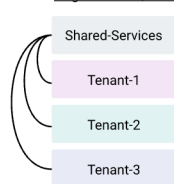
## Typical Architecture



# Segmentation and NAT Support

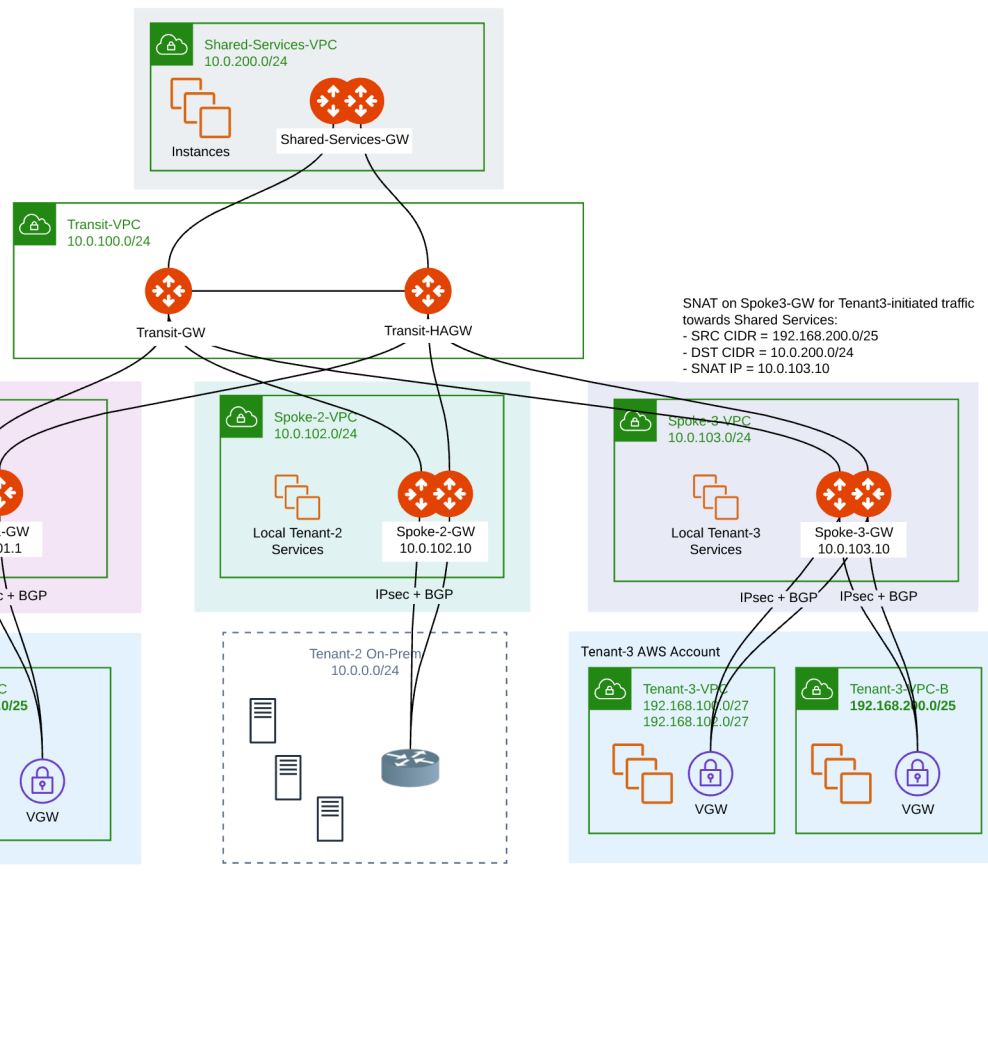
- SaaS Providers Aviatrix Validated Design  
<https://aviatrix.com/resources/design-guides/aviatrix-validated-design-saas-providers-infrastructure>

## Segmentation Domains



SNAT on Spoke1-GW for Tenant1-initiated traffic towards Shared Services:

- SRC CIDR = 192.168.200.0/25
- DST CIDR = 10.0.200.0/24
- SNAT IP = 10.0.101.10



Multi-Cloud Network Architecture for Businesses with SaaS Offerings

**Overview**  
Growth of Software as a Service (SaaS) companies has accelerated over the past decade as SaaS providers have enjoyed the agility and time-to-market advantages not possible with traditional software on-premises. SaaS regions and multi-cloud providers are the leading way for businesses to reach a growing number of customers around the globe.  
However, as cloud service delivery models become increasingly business critical, SaaS businesses discover that their customers' and their own security and business requirements, service delivery quality objectives, and costs become more difficult to achieve.  
The Aviatrix cloud network platform provides the proven solution SaaS providers need for enterprise-class cloud networking, security and operations required for seamless multi-cloud environments. This document outlines the technical challenges and SaaS services has designed SaaS business face, the Aviatrix solution, and provides a validated design that SaaS providers request by inspection from cloud network and security infrastructure and customer quality and transformation capabilities.



Aviatrix Validated Design for SaaS providers enables secure connectivity to and consistent management of multi-cloud environments. This document outlines the technical challenges and SaaS services has designed SaaS business face, the Aviatrix solution, and provides a validated design that SaaS providers request by inspection from cloud network and security infrastructure and customer quality and transformation capabilities.

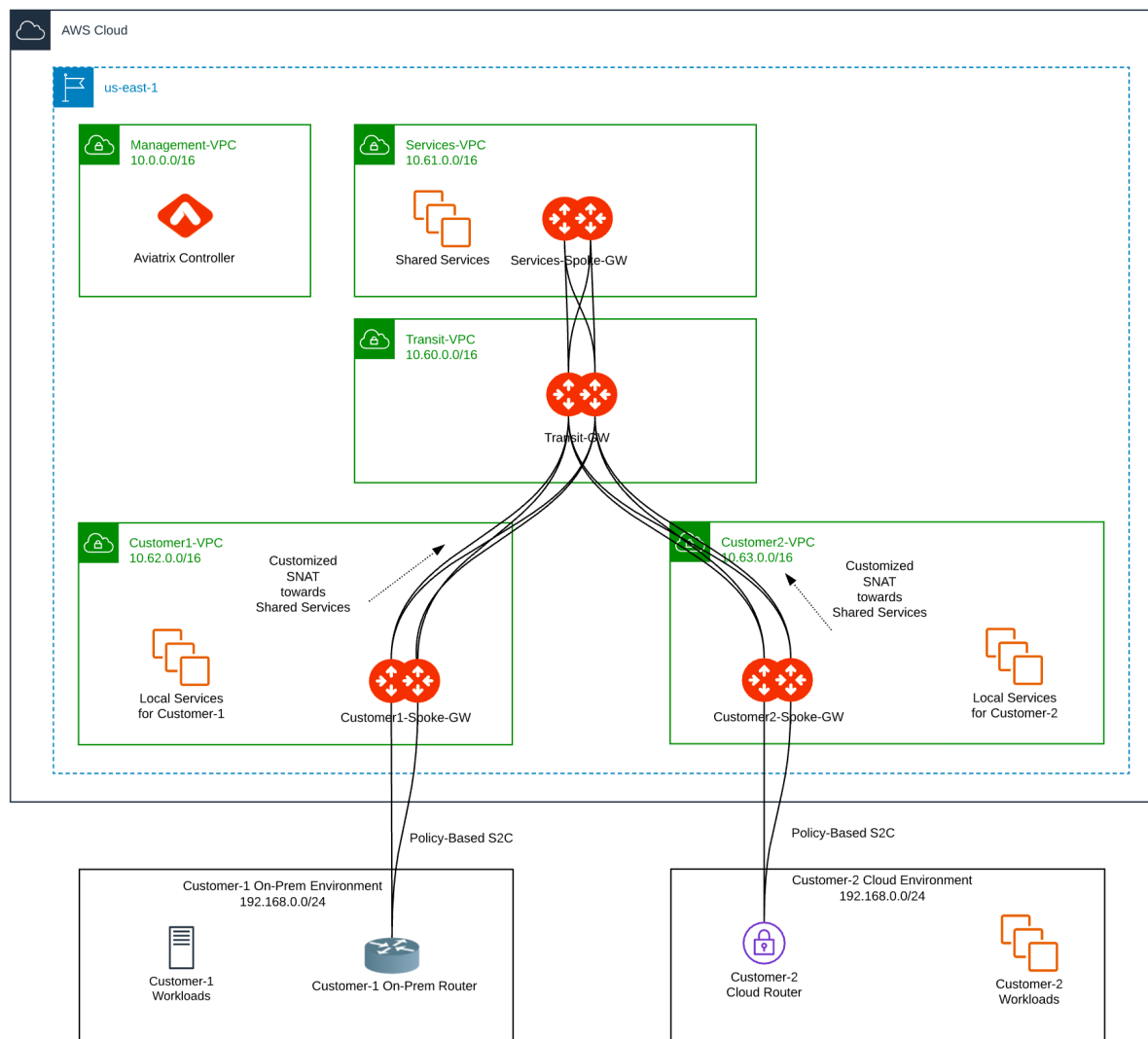


## Use Cases

Overlapping IP Space Scenarios

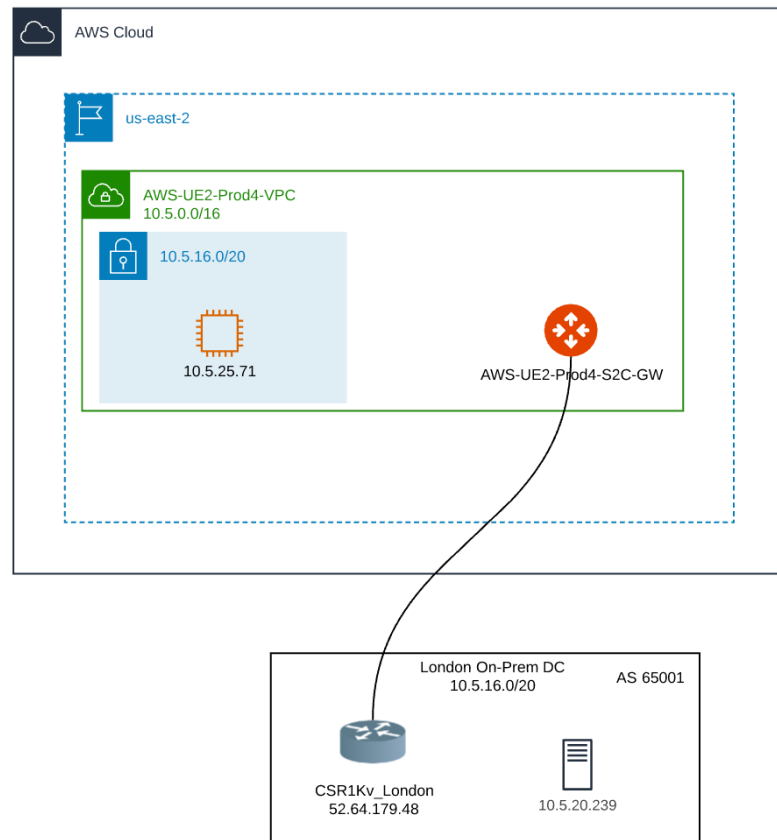
# SaaS Provider Scenario

- Tenants could be on-prem or in their own cloud environment, separate from the customer cloud environment
- Tenants are onboarded via policy-based or route-based Site2Cloud with static routing, landing on ActiveMesh spoke gateways
- They land in their own VPCs to handle overlapping IP scenarios and provide them local services
- Customized SNAT is used to uniquely differentiate incoming overlapping tenant traffic when communicating with shared services



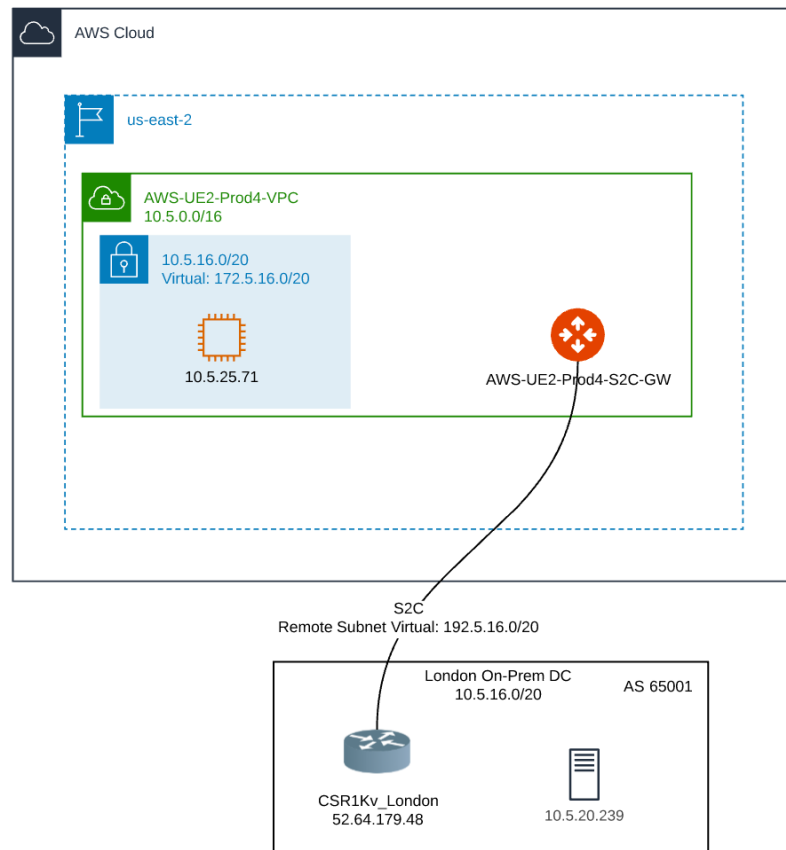
# Requirements

- 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
- **Route-based** IPsec is required





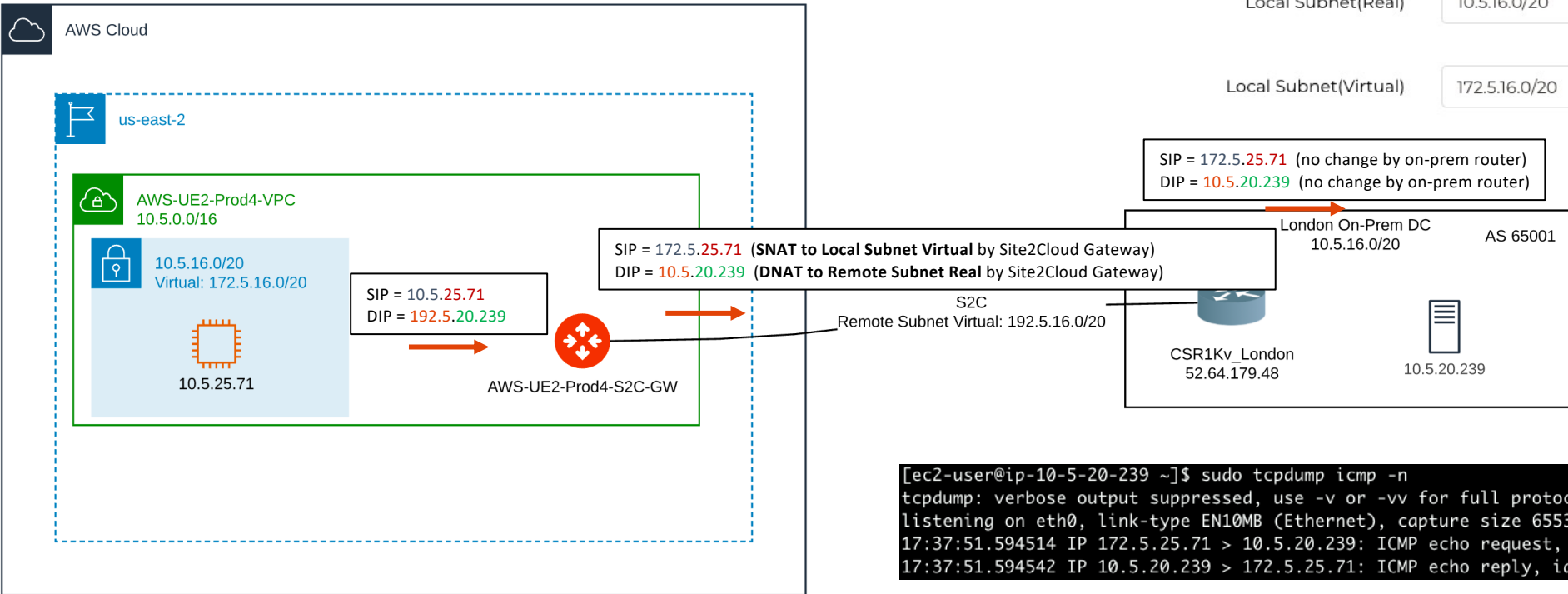
# Packet Walk

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



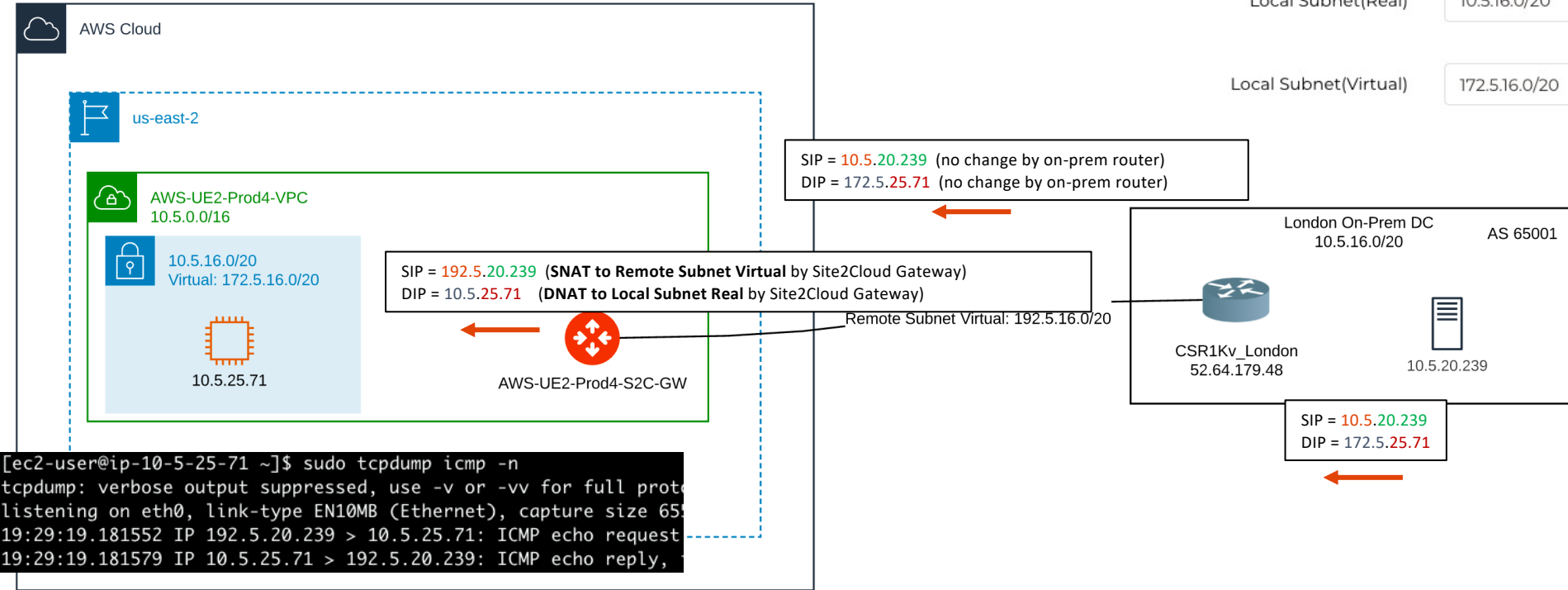
# Packet Walk – Return Traffic

Remote Subnet (Real) 10.5.16.0/20

Remote Subnet (Virtual) 192.5.16.0/20

Local Subnet(Real) 10.5.16.0/20

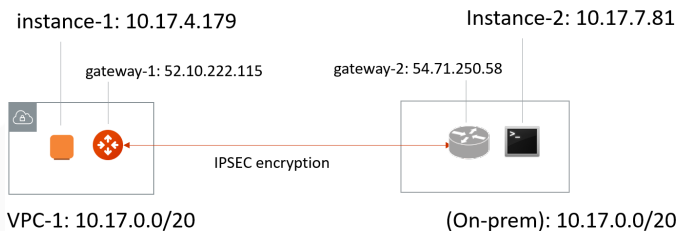
Local Subnet(Virtual) 172.5.16.0/20



# Overlapping IP Use Cases for Site2Cloud – Reference

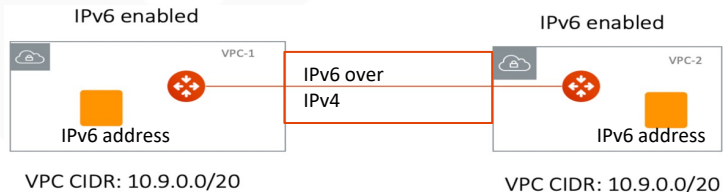
## Overlapping CIDRs Within Cloud(s) or Directly to a VPC

[https://docs.aviatrix.com/HowTos/connect\\_overlap\\_cidrs.html](https://docs.aviatrix.com/HowTos/connect_overlap_cidrs.html)



## Use IPv6 to Connect Overlapping VPC CIDRs

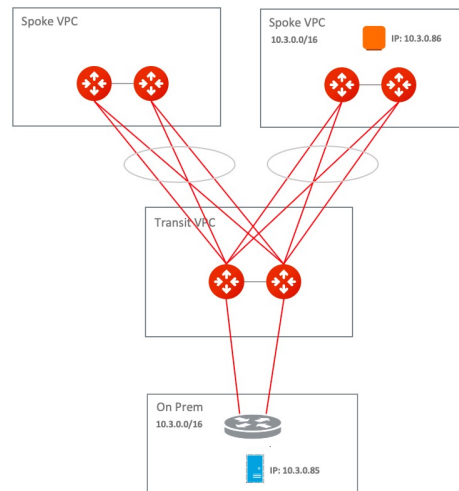
[https://docs.aviatrix.com/HowTos/ipv6\\_peering.html](https://docs.aviatrix.com/HowTos/ipv6_peering.html)



**Requirement:** EC2 instances can communicate with each other with IPv6

## Aviatrix ActiveMesh with Customized SNAT and DNAT on Spoke Gateway

[https://docs.aviatrix.com/HowTos/transit\\_solution\\_activemesh\\_spoke\\_snat\\_dnat\\_rfc1918.html](https://docs.aviatrix.com/HowTos/transit_solution_activemesh_spoke_snat_dnat_rfc1918.html)



## Other Overlapping IP CIDR Solutions

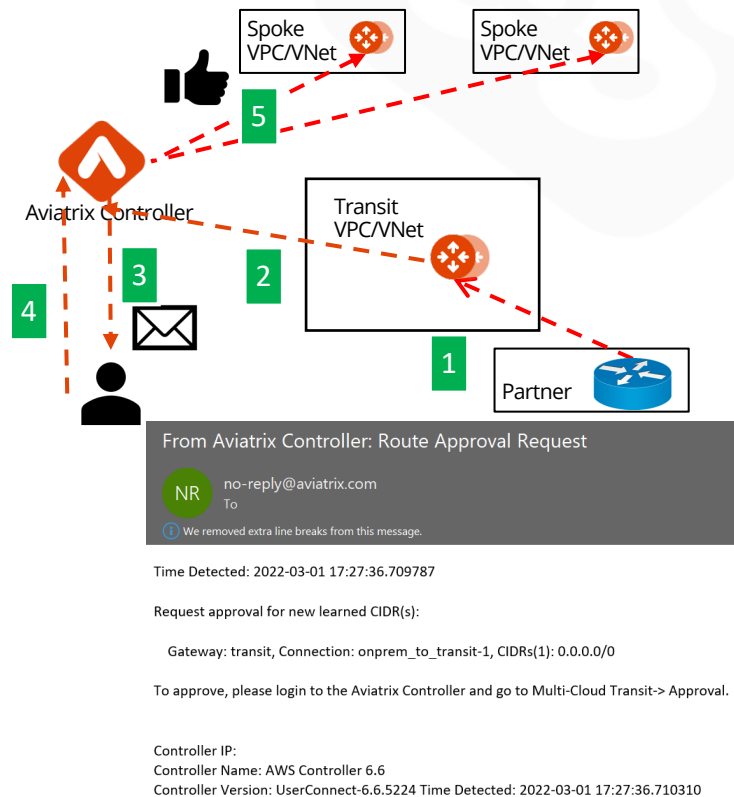
[https://docs.aviatrix.com/HowTos/overlapping\\_network\\_solutions.html](https://docs.aviatrix.com/HowTos/overlapping_network_solutions.html)



## 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**



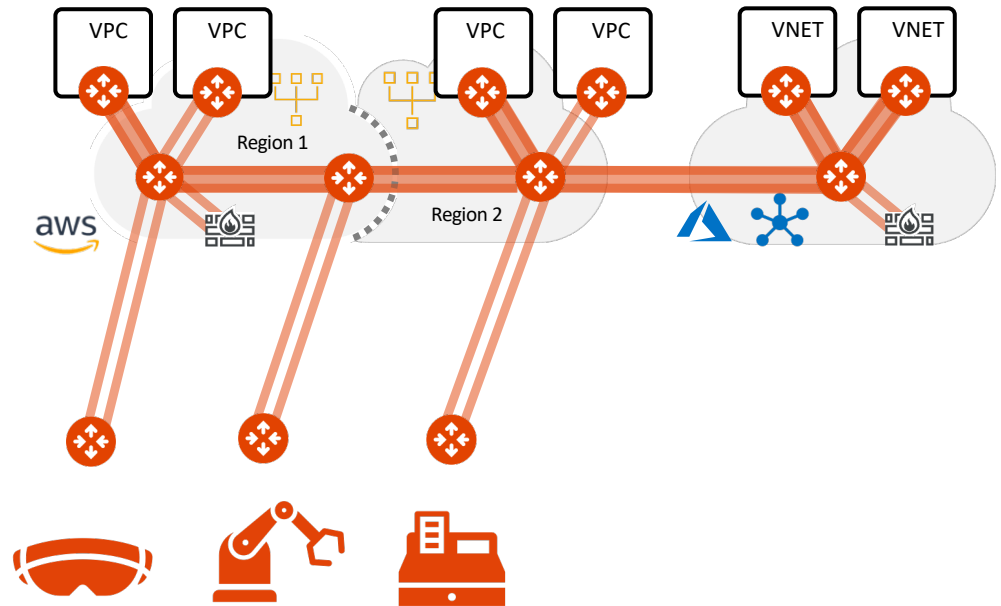
**Simplified Edge Management**



**Consistent Secure Edge**

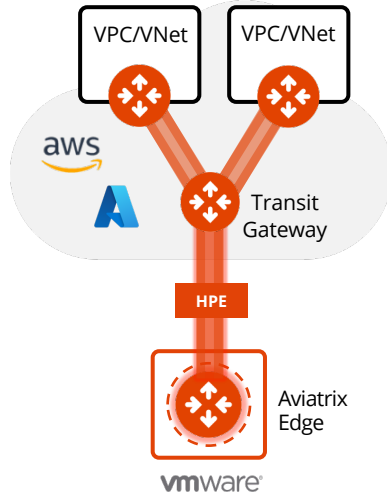


**Simplified Edge On-boarding**

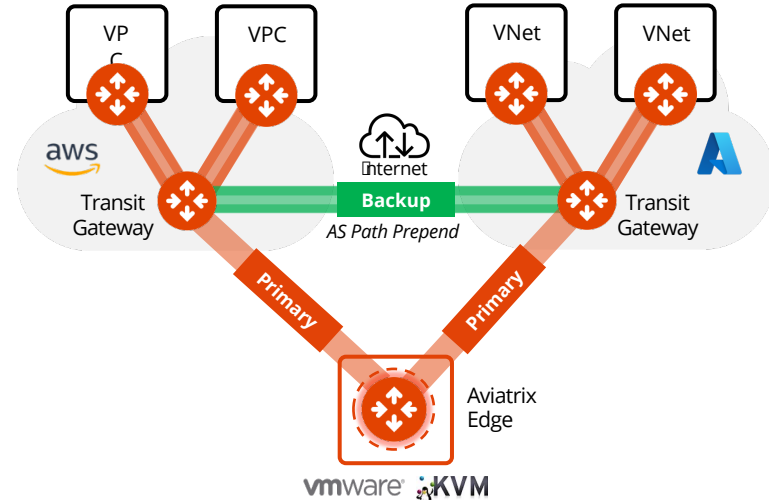


# Aviatrix Edge Use Cases

## Extend the Aviatrix Platform to the Edge

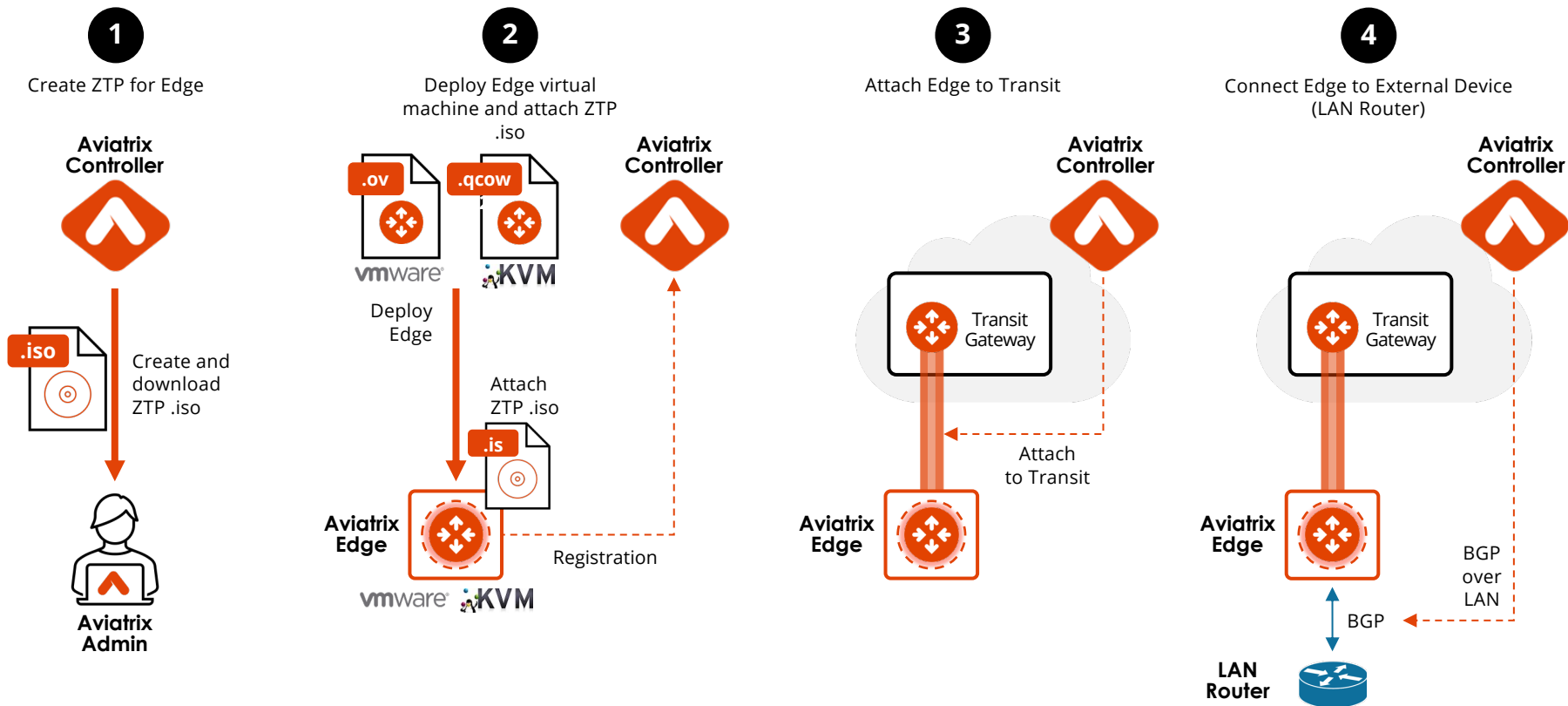


## Multi-Cloud Connectivity via Aviatrix Edge





# Edge 2.0 Deployment Workflow - Demo

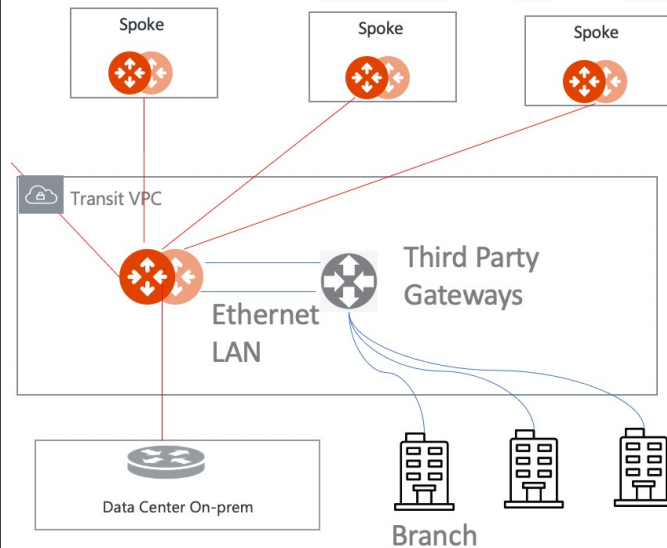
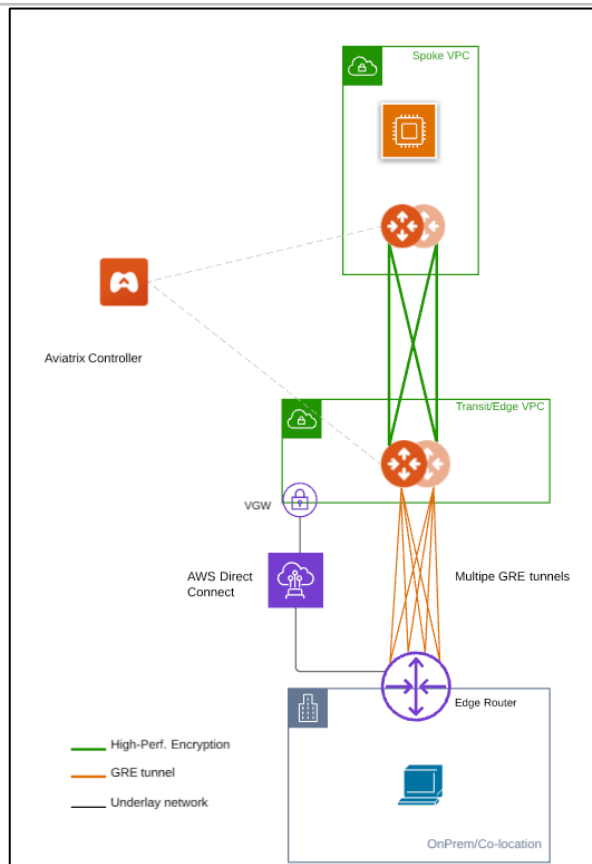




Other Services to Connect to External  
Networks

# 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)







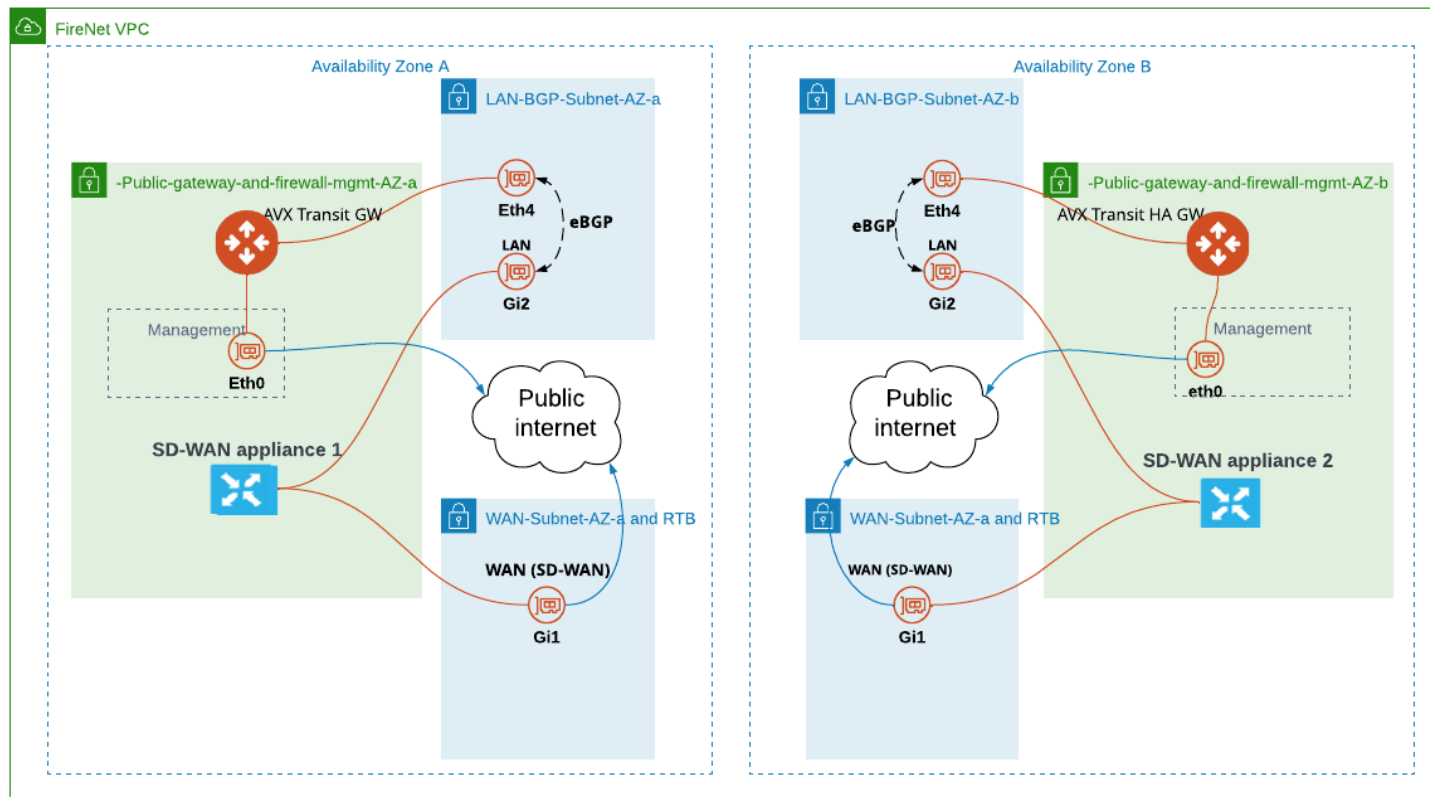
## SD-WAN Integration

# Solution – SD-WAN integration with Aviatrix

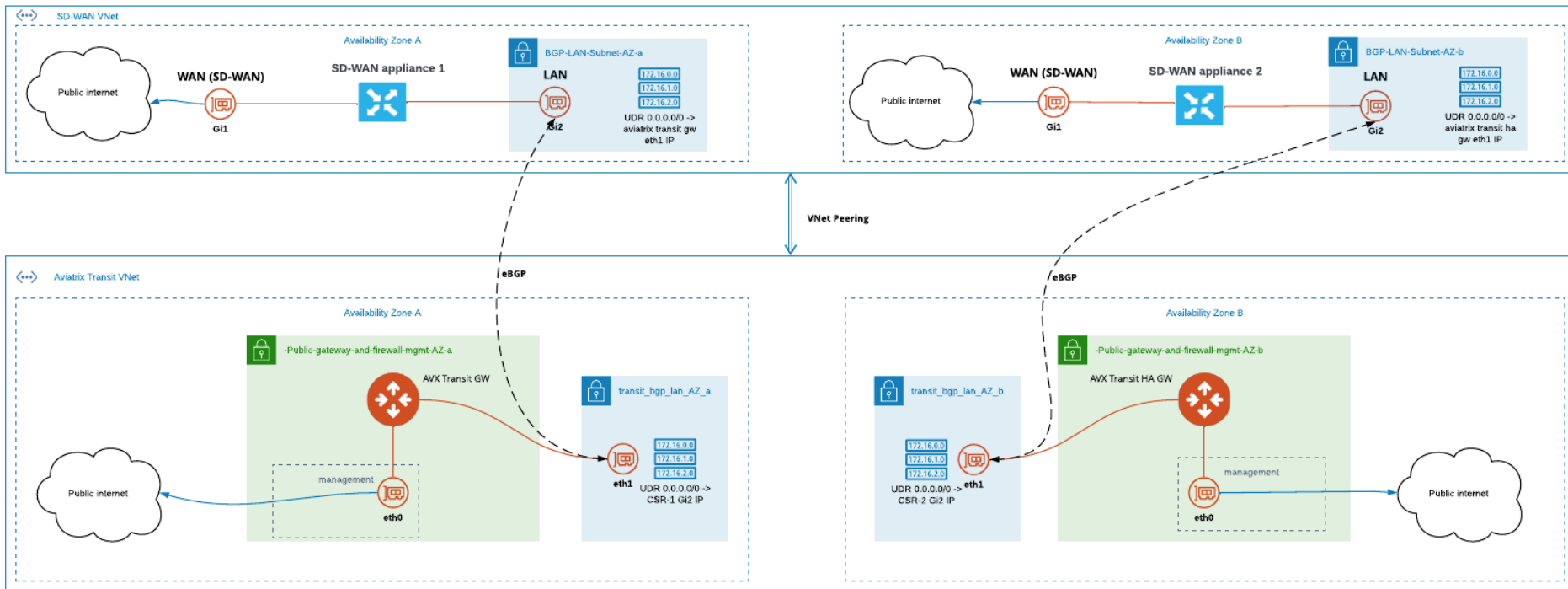
- BGP based integration with SD-WAN cloud instances
  - BGP over IPsec
  - BGP over LAN
  - BGP over GRE
- Service chaining by inspecting traffic with Next Gen Firewalls
- Advanced Traffic Engineering and Filtering options
- All other Aviatrix benefits apply



# BGP over LAN in AWS



# BGP over LAN in Azure







Next: Lab 8 – Site2Cloud