

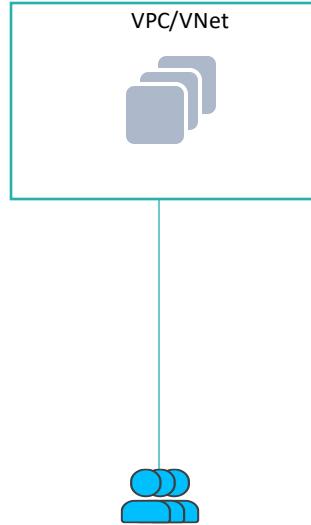


User VPN

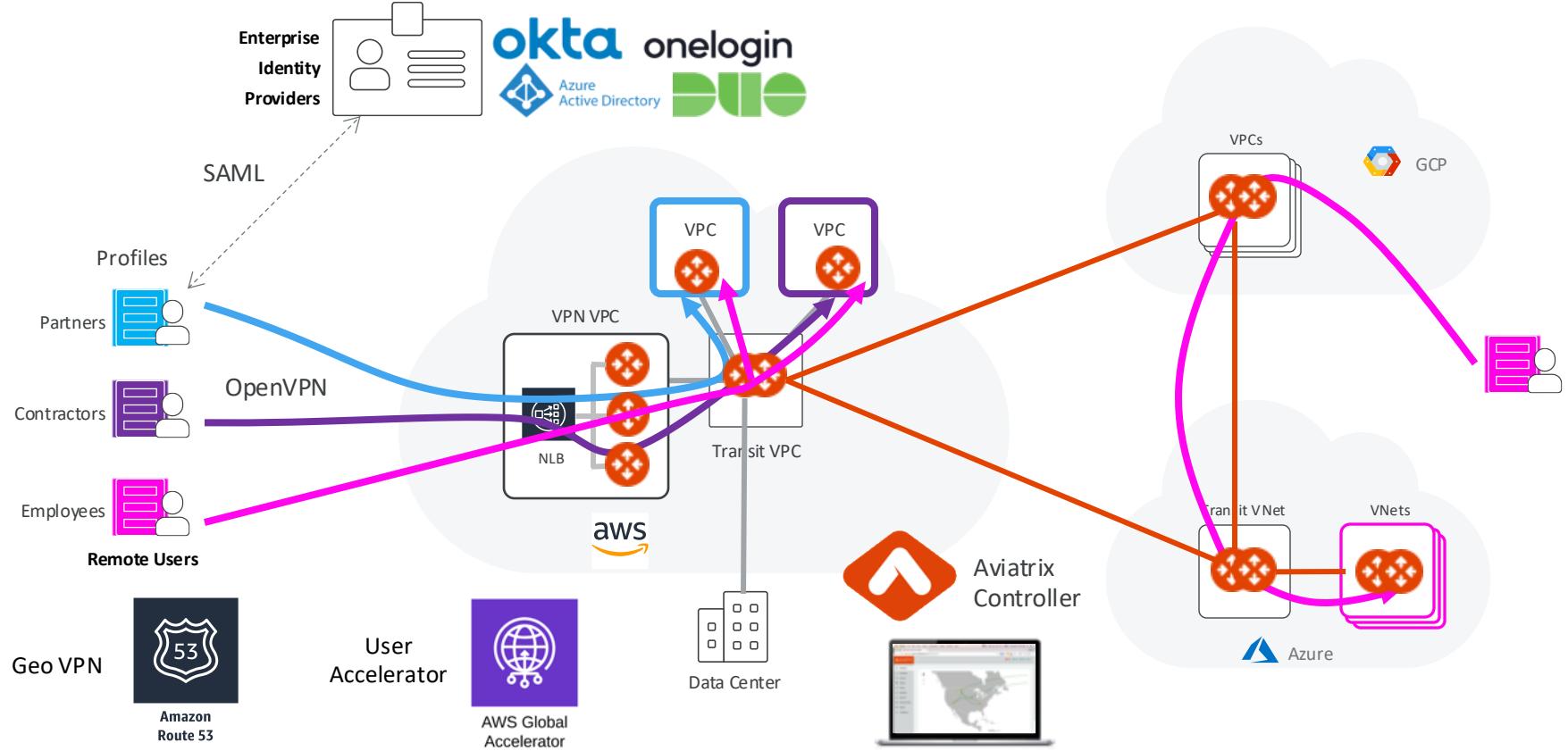
ACE Team

Problem Statement

- Connect **users/partners/developers** securely and seamlessly to public cloud resources
- **Least latency** accessing the cloud resources
- Cloud-native: **should not backhaul** to on-premises Data Center first
- Enterprise-grade: **Identity Provider** integration
- **Multicloud** repeatability



User VPN Overview



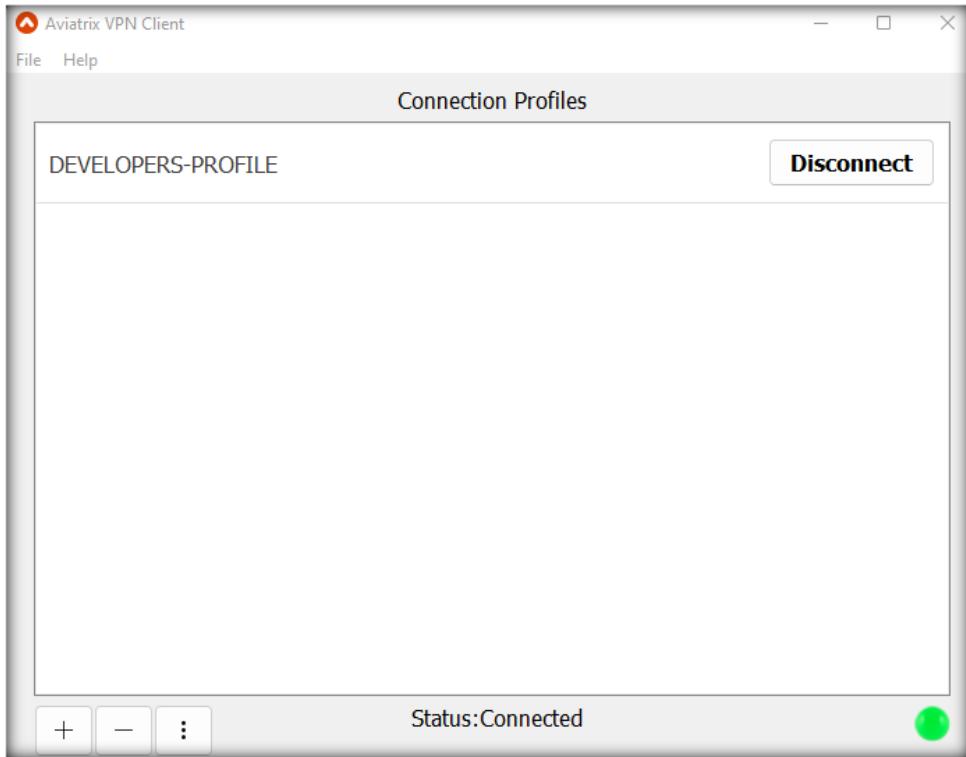
Client Software

- OpenVPN Client

- All OpenVPN client software are supported. The supported clients are macOS, Windows iOS, Android, Chromebook, Linux and BSD

- Aviatrix VPN Client

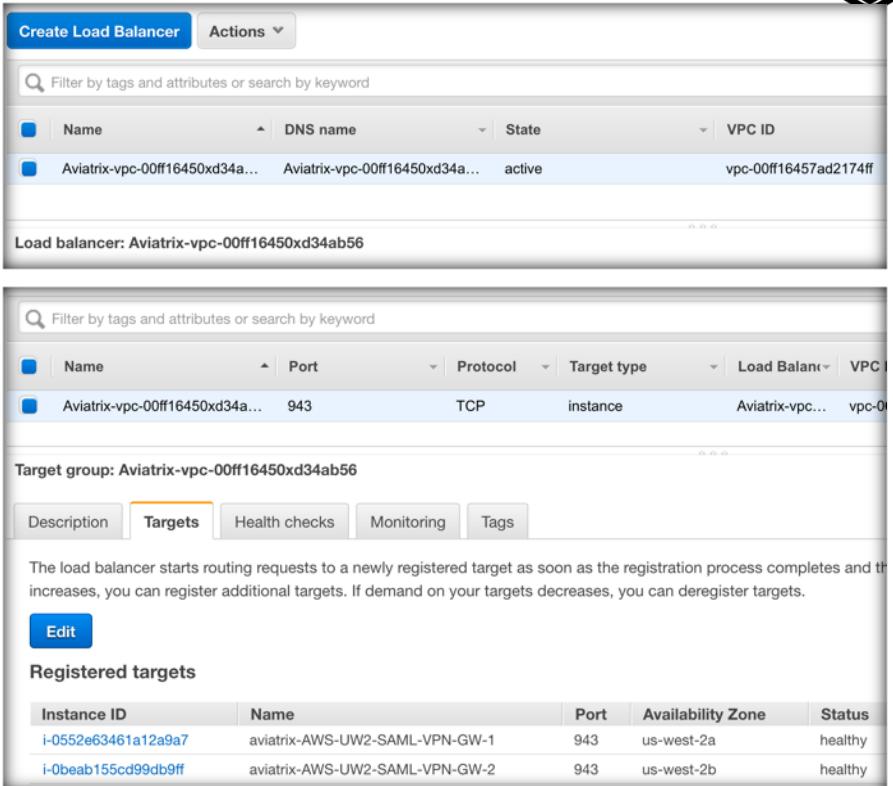
- Aviatrix VPN Client supports macOS, Windows, Linux Debian distribution, and BSD distribution
- Choose Aviatrix VPN Client if you require SAML authentication directly from VPN client software



<https://docs.aviatrix.com/previous/documentation/latest/aviatrix-openvpn/download-vpn-client.html>

Automated Load Balancer

- The controller automatically launches a cloud-native load balancer based on the cloud type
- Automates target groups to attach Aviatrix VPN gateways to the LB
- The domain name of the cloud provider's load balancer, such as AWS ELB, will be the connection when a VPN user connects to the VPN gateway
- Seamless relaunch of VPN Gateways after deletion without reissuing a new .ovpn cert file



The screenshot displays two main sections of the Aviatrix Cloud Control Platform:

Create Load Balancer (Top Section):

Name	DNS name	State	VPC ID
Aviatrix-vpc-00ff16450xd34a...	Aviatrix-vpc-00ff16450xd34a...	active	vpc-00ff1645ad2174ff

Target group: Aviatrix-vpc-00ff16450xd34ab56 (Bottom Section):

Name	Port	Protocol	Target type	Load Balancer	VPC
Aviatrix-vpc-00ff16450xd34a...	943	TCP	instance	Aviatrix-vpc...	vpc-0

Targets Tab (Selected):

The Targets tab is selected, showing the following information:

The load balancer starts routing requests to a newly registered target as soon as the registration process completes and there increases, you can register additional targets. If demand on your targets decreases, you can deregister targets.

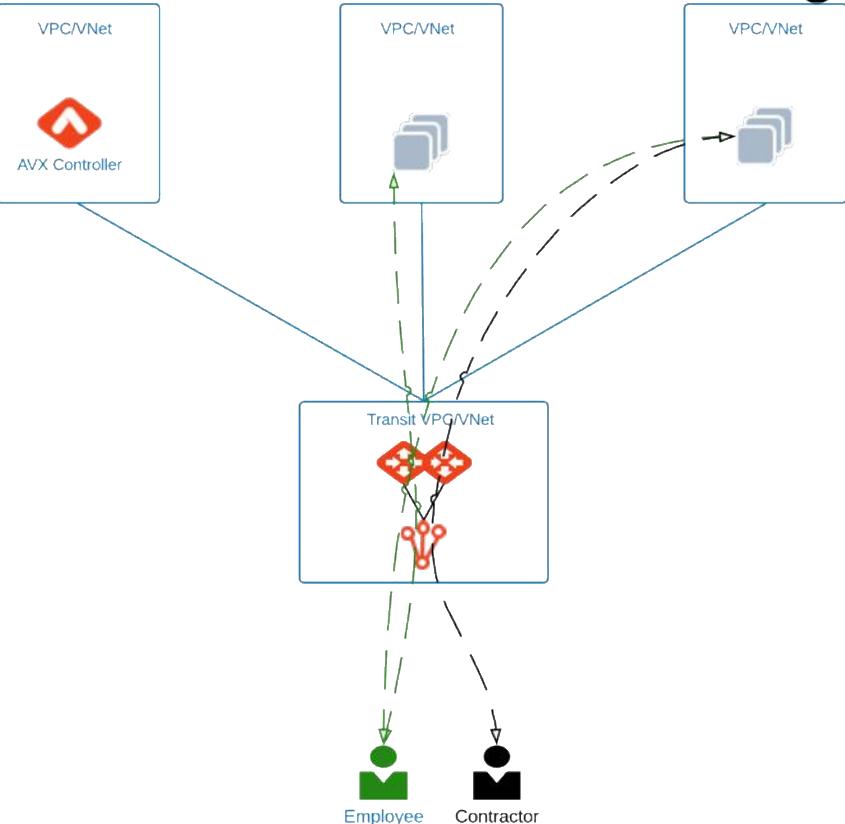
Edit button

Registered targets

Instance ID	Name	Port	Availability Zone	Status
i-0552e63461a12a9a7	aviatrix-AWS-UW2-SAML-VPN-GW-1	943	us-west-2a	healthy
i-0beab155cd99db9ff	aviatrix-AWS-UW2-SAML-VPN-GW-2	943	us-west-2b	healthy

Profile-Based Security Policies

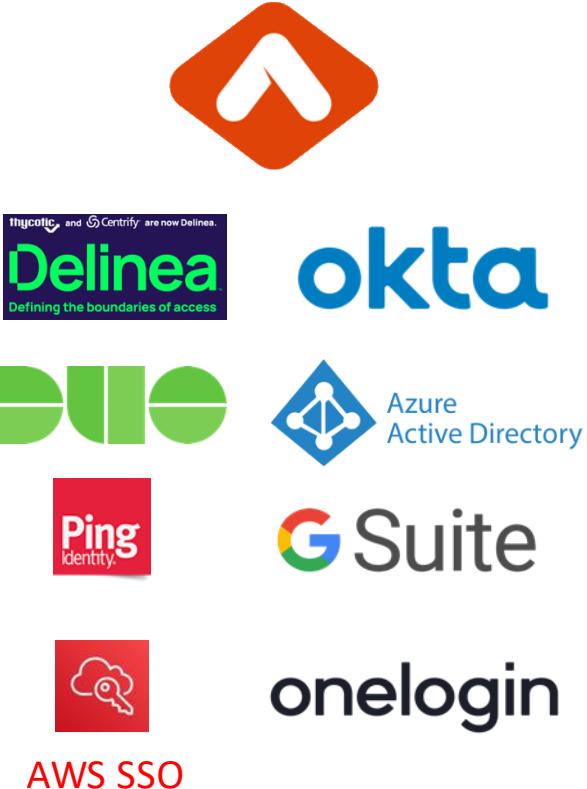
- A user is dynamically assigned a virtual IP address when connected to a gateway
- Isolation between employees, contractors, partners, or developers
- Supports multiple profiles
- Automated firewall rules
- Security based on user not source IP
- The security policy is dynamically pushed to the landing Aviatrix VPN gateway when a VPN user connects
- It is only active when a VPN user is connected
- When a VPN user disconnects, the security policy is deleted from the VPN gateway





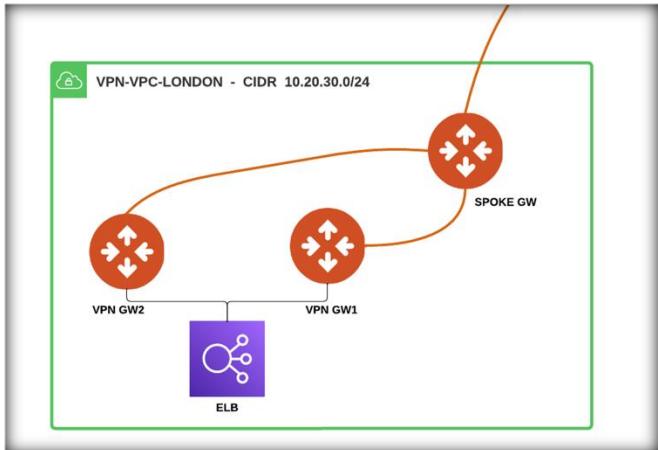
Secure Assertion Markup Language

- Supports IDPs like Azure AD, Okta, Duo, Office 365
- User accounts are onboarded on the IDP portal
- Users can be onboarded on Aviatrix controller if SAML is not required



Ad-hoc VPN VPC

- Create a dedicated VPC
 - Select the **Default** VPC (i.e. Spoke VPC)
- This VPC will host the User-VPN Gateways, the ELB and the Spoke Gateways



Create VPC/VNet

Name:

Cloud: aws Standard Azure GCP OCI Alibaba

Account: aws-account

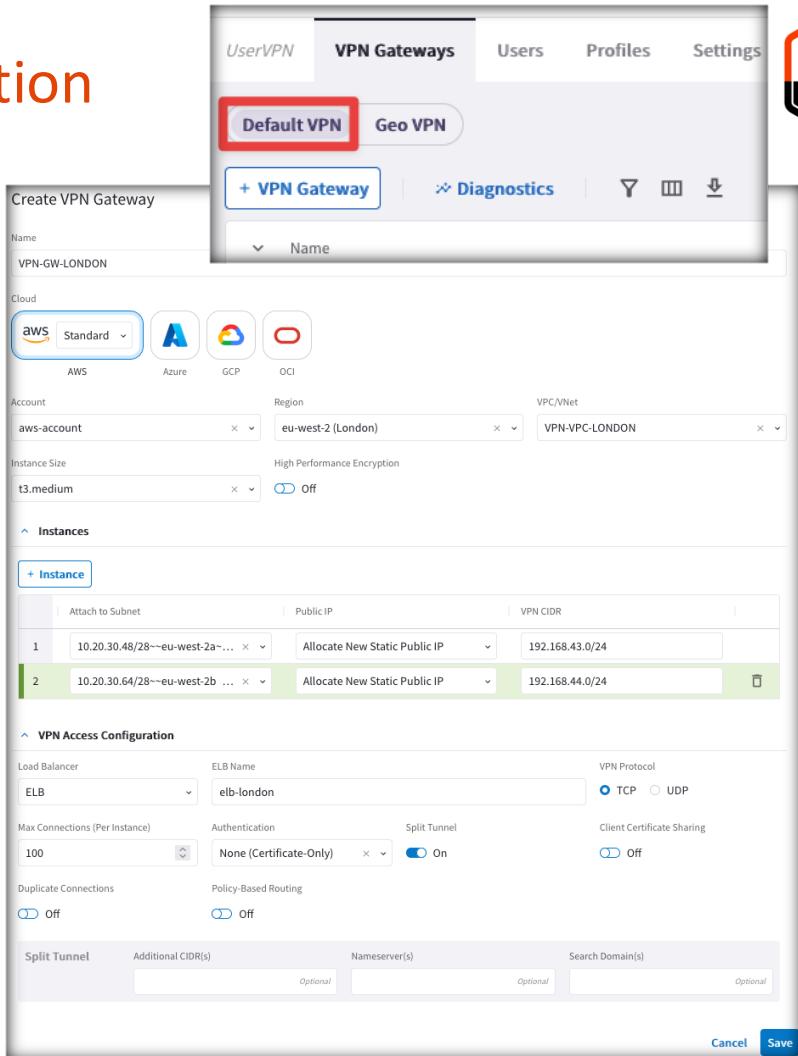
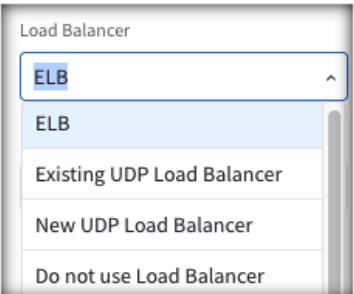
Region: eu-west-2 (London)

VPC CIDR: 10.20.30.0/24

VPC Function:

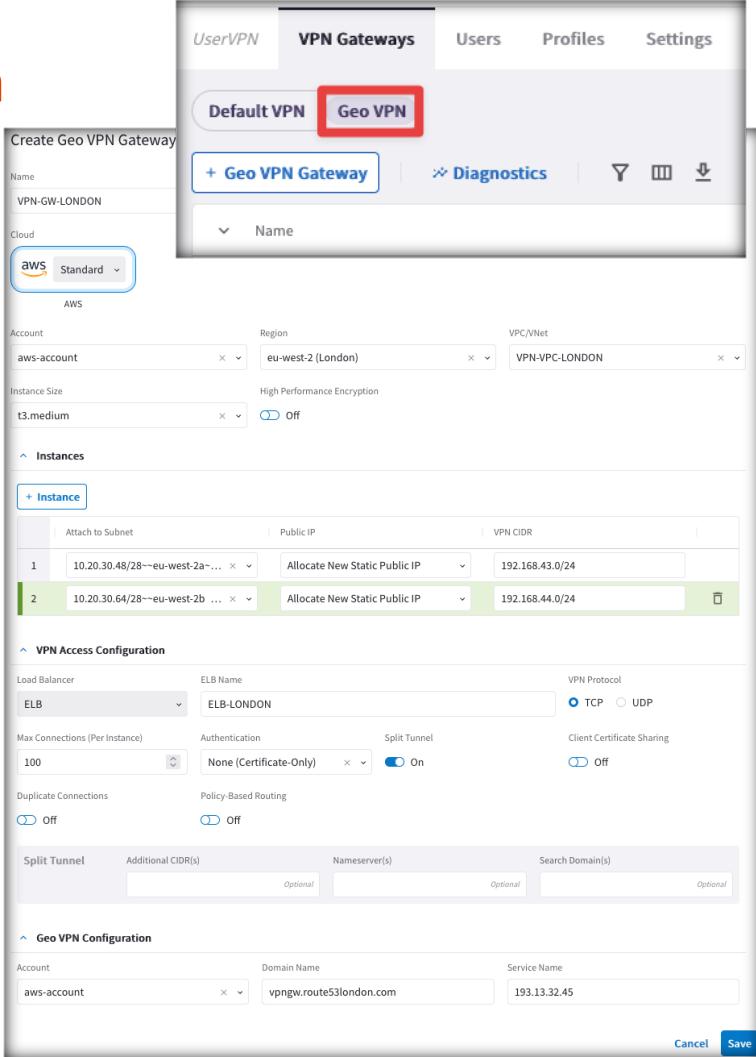
Default VPN Gateways and ELB Creation

- Configure one or more VPN Gateways
 - Each VPN Gateway must be configured with its own **VPN CIDR Block**
 - When a VPN user connects to the VPN gateway, the user will be assigned a virtual IP address from the VPN CIDR Block
 - The default IP address pool is **192.168.43.0/24**
- The ELB template is pre-configured by default
 - Depending on the cloud type you selected, you can select:
 - **ELB**
 - **Existing UDP Load Balancer**
 - **New UDP Load Balancer**
 - **No Load Balancer**



Geo VPN Gateways and ELB Creation

- Configure one or more VPN Gateways
 - Each VPN Gateway must be configured with its own **VPN CIDR Block**
 - When a VPN user connects to the VPN gateway, the user will be assigned a virtual IP address from the **VPN CIDR Block**
 - The default IP address pool is **192.168.43.0/24**
- The ELB template is pre-configured by default
- Geo VPN configuration options:
 - Domain Name: this domain name must be hosted by AWS Route53
 - VPN Service: the hostname that users will connect to



The screenshot shows the Aviatrix Cloud interface for creating a Geo VPN Gateway. The top navigation bar includes tabs for UserVPN, VPN Gateways (highlighted in red), Users, Profiles, and Settings. A sub-menu for 'Default VPN' and 'Geo VPN' is displayed, with 'Geo VPN' being selected. The main panel is titled 'Create Geo VPN Gateway' and contains the following fields:

- Name:** VPN-GW-LONDON
- Cloud:** AWS (Standard)
- Account:** aws-account
- Region:** eu-west-2 (London)
- VPC/VNet:** VPN-VPC-LONDON
- Instance Size:** t3.medium
- Encryption:** High Performance Encryption (Off)
- Instances:** Two instances are listed:
 - Instance 1: Attach to Subnet 10.20.30.48/28, Public IP Allocate New Static Public IP, VPN CIDR 192.168.43.0/24
 - Instance 2: Attach to Subnet 10.20.30.64/28, Public IP Allocate New Static Public IP, VPN CIDR 192.168.44.0/24
- VPN Access Configuration:**
 - Load Balancer: ELB
 - ELB Name: ELB-LONDON
 - VPN Protocol: TCP (selected)
 - Max Connections (Per Instance): 100
 - Authentication: None (Certificate-Only)
 - Split Tunnel: On
 - Duplicate Connections: Off
 - Policy-Based Routing: Off
- Geo VPN Configuration:**
 - Account: aws-account
 - Domain Name: vpngw.route53london.com
 - Service Name: 193.13.32.45

At the bottom right are 'Cancel' and 'Save' buttons.

Create the Spoke GW inside the VPN VPC

- After the VPN Gateways deployment:
 - >Create the Spoke Gateway inside the VPN VPC
 - The Aviatrix Controller will take care of the routing between the VPN Gateway and the Spoke Gateway
 - Attach the Spoke Gateway to any Transit Gateways such that the VPN Gateway will be able to be interconnected to the MCNA

Create Spoke Gateway

Name: SPOKE-GW-LONDON

Cloud: AWS (Standard) Azure GCP OCI Alibaba

Account: aws-account Region: eu-west-2 (London) VPC/VNet: VPN-VPC-LONDON (highlighted with a red box)

Instance Size: t3.micro High Performance Encryption: Off Attach To Transit Gateway: AVX-AWS-TRANSIT-GW

Advanced Settings

BGP: Off

Instances

+ Instance

	Attach to Subnet	Public IP
1	10.20.30.48/28~~eu-west-2a~~VPN-VPC-LONDON-Publi... (highlighted with a red box)	Allocate New Static Public IP

Cancel Save

Create a VPN Profile

- The profile-based security policy lets you define security rules to a target address, protocol, and ports.
- The default rule for a profile can be configured as deny all or allow all during profile creation.
- This capability allows flexible firewall rules based on the users, instead of a source IP address.

Create Profile

Name

Allow All Deny All

+ Deny Rule

	Target CIDR	Protocol	Port	
1	10.1.1.64/28	ALL	x v 0:65535	
2	10.1.1.48/28	ALL	x v 0:65535	
3	10.1.2.48/28	ALL	x v 0:65535	

User

Cancel **Save**

Create a VPN User

- After at least one gateway is created, you can add VPN users.
- As soon as a user is created, an email is sent from right away to the recipient, with instructions on how to download client software and connect to a VPN server
- If you would like to assign user profile-based policies, you need to create profiles first

Create VPN User

Name

Email

VPN Gateway

Base Policy

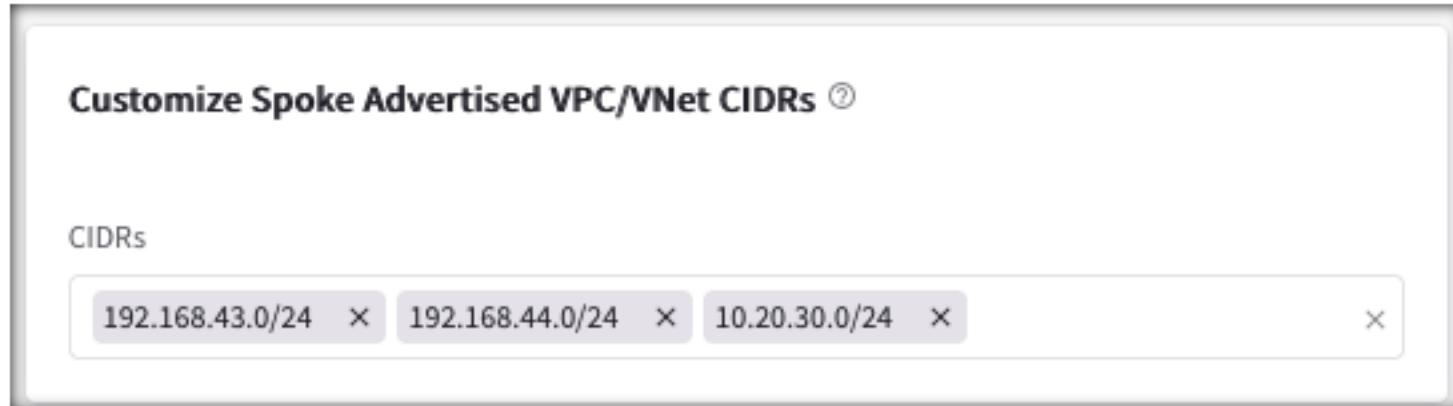
Allow All Deny All

Profile

Cancel Save

Preserve Client IP

- Client IP can be preserved up to the application
- NAT needs to be disabled on the VPN gateway
- VPN CIDRs must be advertised to the transit for return traffic, from the Spoke Gateway



Customize Spoke Advertised VPC/VNet CIDRs ?

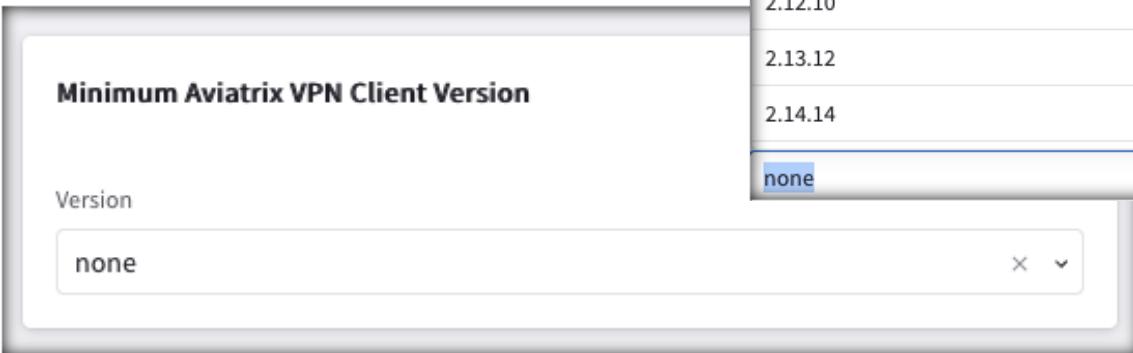
CIDRs

192.168.43.0/24 X 192.168.44.0/24 X 10.20.30.0/24 X X

A screenshot of a software window titled "Customize Spoke Advertised VPC/VNet CIDRs". The window has a light gray background with rounded corners. At the top, there's a title bar with the window title. Below the title, the word "CIDRs" is displayed. A horizontal list of three CIDR blocks is shown, each enclosed in a light gray button-like box with a close ("X") button on the right. The first two boxes have a small "X" icon to their left, and the third one has two "X" icons to its left. The entire window is surrounded by a thick gray border.

Minimum Client Version & Duplicate Connections

- Enforcement of Minimum VPN Client Version
- Duplicate Connections
 - User can connect simultaneously from multiple devices
 - When disabled, simultaneous sessions are not allowed, and existing VPN connection gets disconnected



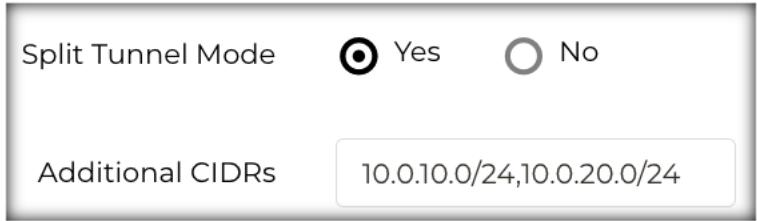
The screenshot shows a configuration dialog box with the title "Minimum Aviatrix VPN Client Version". Inside the dialog, there is a dropdown menu labeled "Version" with the option "none" selected. A vertical scroll bar is visible on the right side of the dropdown menu. The dropdown menu lists the following version options:

- none
- 2.4.10
- 2.5.7
- 2.6.6
- 2.7.9
- 2.8.2
- 2.9.6
- 2.10.7
- 2.11.6
- 2.12.10
- 2.13.12
- 2.14.14

Split Tunnel or Full Tunnel

- **Split Tunnel**

Only specified CIDRs ranges go through the VPN tunnel



- **Full Tunnel**

All user IP sessions including Internet browsing go through the VPN tunnel

```
[umair@umair-mbp ~ % ifconfig utun5
utun5: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 1500
        inet 192.168.44.6 --> 192.168.44.5 netmask 0xffffffff
[umair@umair-mbp ~ % netstat -r
Routing tables

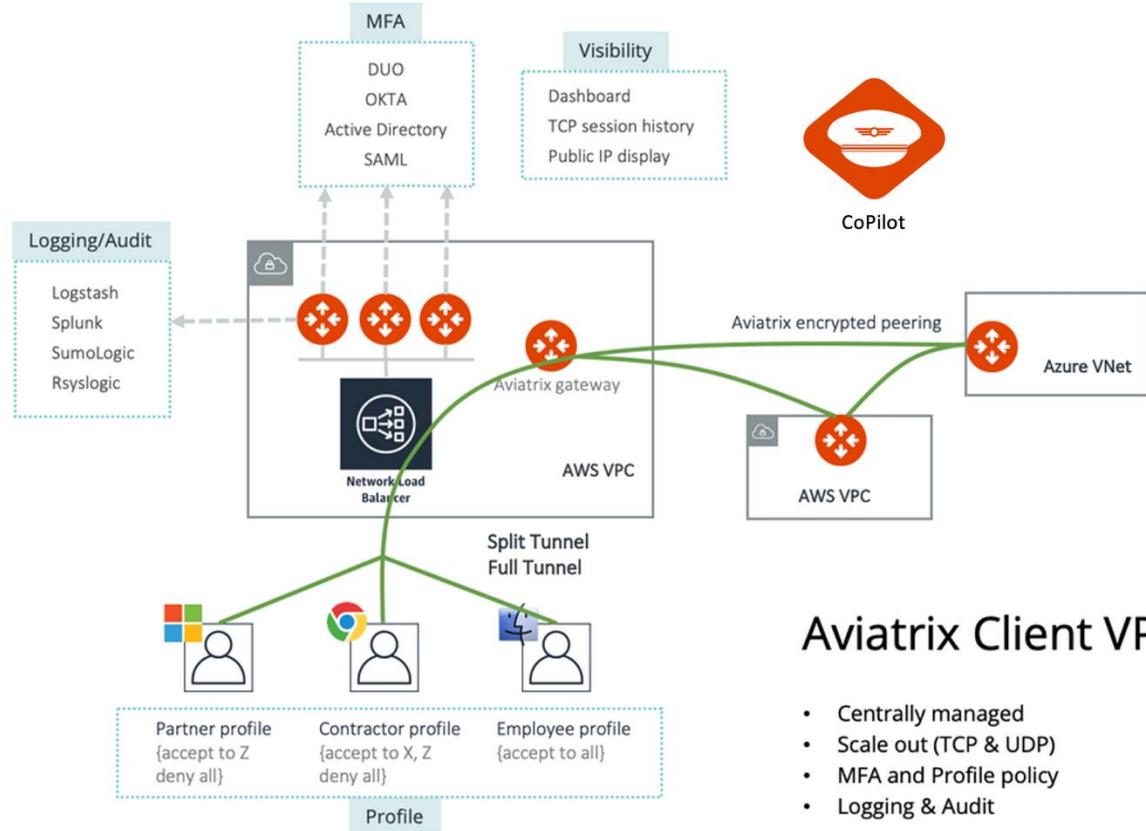
Internet:
Destination      Gateway          Flags      Netif Expire
default          192.168.1.1    UGScg      en0
10.0.10/24       192.168.44.5   UGSc      utun5
10.0.20/24       192.168.44.5   UGSc      utun5
```

Gateway Failover

- Users will automatically get reconnected to another VPN gateway behind the load-balancer
- No change of certificate or user intervention

```
umair@umair-mbp ~ % ifconfig utun4
utun4: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 1500
inet 192.168.43.14 --> 192.168.43.13 netmask 0xffffffff
umair@umair-mbp ~ % ping 10.120.127.191
PING 10.120.127.191 (10.120.127.191): 56 data bytes
64 bytes from 10.120.127.191: icmp_seq=0 ttl=250 time=73.976 ms
64 bytes from 10.120.127.191: icmp_seq=1 ttl=250 time=70.885 ms
64 bytes from 10.120.127.191: icmp_seq=2 ttl=250 time=70.846 ms
64 bytes from 10.120.127.191: icmp_seq=3 ttl=250 time=60.916 ms
64 bytes from 10.120.127.191: icmp_seq=4 ttl=250 time=67.720 ms
64 bytes from 10.120.127.191: icmp_seq=5 ttl=250 time=61.405 ms
64 bytes from 10.120.127.191: icmp_seq=6 ttl=250 time=61.982 ms
Request timeout for icmp_seq 7
Request timeout for icmp_seq 8
Request timeout for icmp_seq 9
Request timeout for icmp_seq 10
Request timeout for icmp_seq 11
Request timeout for icmp_seq 12
Request timeout for icmp_seq 13
Request timeout for icmp_seq 14
Request timeout for icmp_seq 15
Request timeout for icmp_seq 16
Request timeout for icmp_seq 17
Request timeout for icmp_seq 18
Request timeout for icmp_seq 19
64 bytes from 10.120.127.191: icmp_seq=20 ttl=250 time=72.759 ms
64 bytes from 10.120.127.191: icmp_seq=21 ttl=250 time=63.880 ms
64 bytes from 10.120.127.191: icmp_seq=22 ttl=250 time=67.266 ms
64 bytes from 10.120.127.191: icmp_seq=23 ttl=250 time=66.668 ms
64 bytes from 10.120.127.191: icmp_seq=24 ttl=250 time=68.084 ms
^C
--- 10.120.127.191 ping statistics ---
25 packets transmitted, 12 packets received, 52.0% packet loss
round-trip min/avg/max/stddev = 60.916/67.199/73.976/4.246 ms
umair@umair-mbp ~ % ifconfig utun4
utun4: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 1500
inet 192.168.44.6 --> 192.168.44.5 netmask 0xffffffff
umair@umair-mbp ~ %
```

UserVPN Reference Architecture



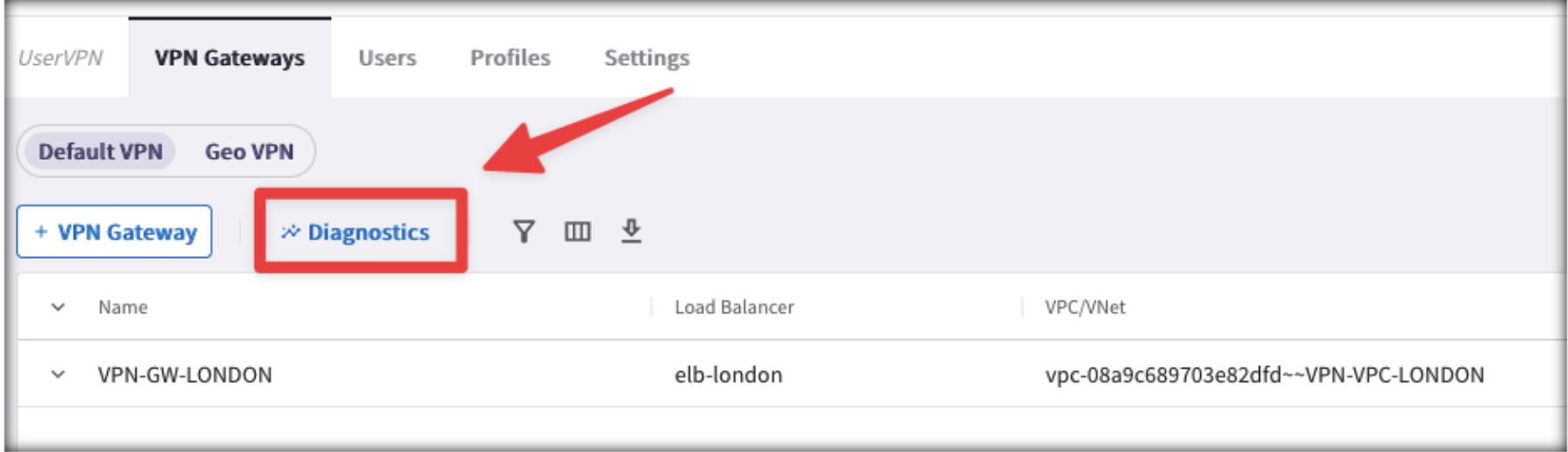
Aviatrix Client VPN Solution

- Centrally managed
- Scale out (TCP & UDP)
- MFA and Profile policy
- Logging & Audit



Visibility and Troubleshooting

User VPN Diagnostics Tools



The screenshot shows the UserVPN interface with the 'VPN Gateways' tab selected. Below it, there are two buttons: 'Default VPN' and 'Geo VPN'. A red box highlights the 'Diagnostics' button, which is located next to a plus sign and a 'VPN Gateway' button. A red arrow points from the top towards the 'Diagnostics' button. The main table displays a single row of data:

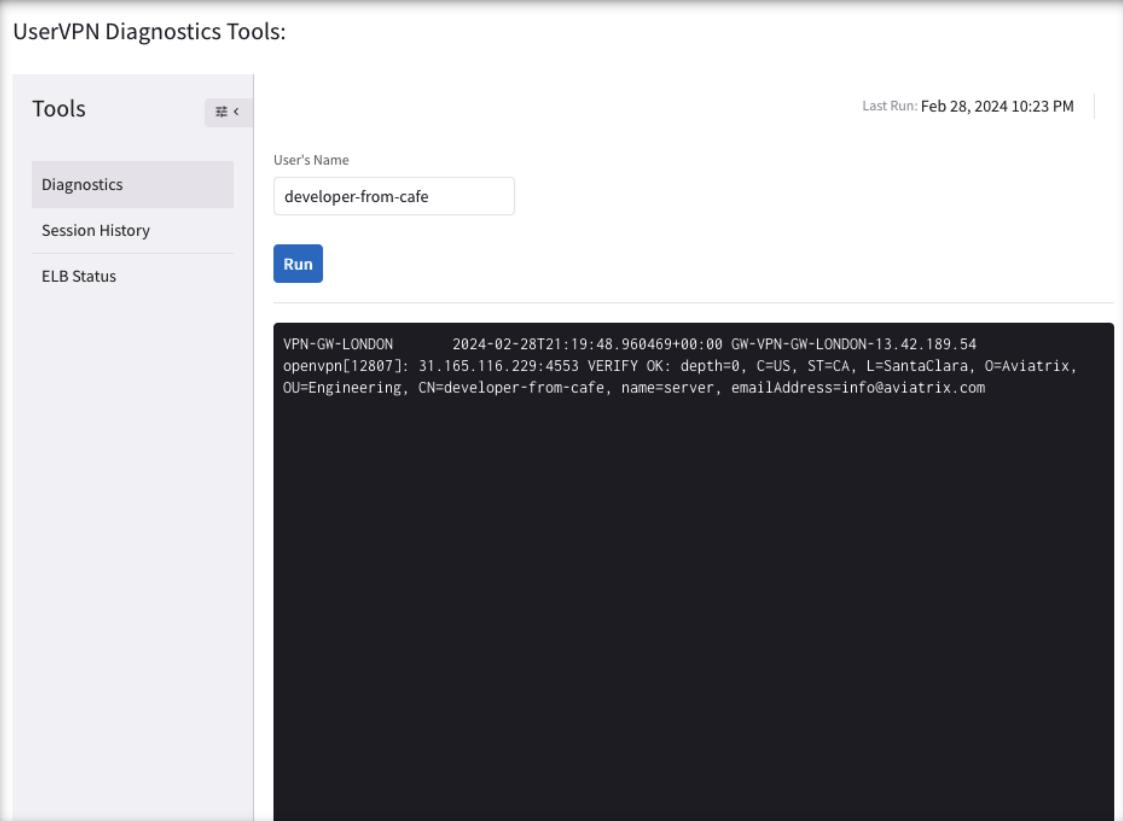
Name	Load Balancer	VPC/VNet
VPN-GW-LONDON	elb-london	vpc-08a9c689703e82dfd~~VPN-VPC-LONDON

- Use the UserVPN **Diagnostics** tool to check a VPN gateway's performance and connectivity

Diagnostics

- **Diagnostics Tab:** to run diagnostics on a VPN user to check their connectivity and performance
- **Session History Tab:** to review specific VPN gateway sessions in more detail
- **ELB Status Tab:** to check on the status of load balancers within specific VPCs/VNet

UserVPN Diagnostics Tools:



Last Run: Feb 28, 2024 10:23 PM

User's Name
developer-from-cafe

Run

VPN-GW-LONDON 2024-02-28T21:19:48.960469+00:00 GW-VPN-GW-LONDON-13.42.189.54
openvpn[12807]: 31.165.116.229:4553 VERIFY OK: depth=0, C=US, ST=CA, L=SantaClara, O=Aviatrix, OU=Engineering, CN=developer-from-cafe, name=server, emailAddress=info@aviatrix.com



Next: Lab 7 – Site2Cloud
Lab 8 – Aviatrix Edge