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The Network Architect's Guide to Multi-Cloud Networking

> Treat cloud networking as its own domain. Cloud networking has its own technology and operational practices and deserves focused attention.
>
> Simon Richard, Gartner Analyst May 2020

Network architecture, network engineering, and network operations serve as the lifeblood of any application. This has always been true in the data center and now applies in the cloud. However, networks are different in public clouds, especially for enterprises with the foresight to architect for multi-cloud optionality.

Read on to learn how network architects and their cloud architect counterparts have become critical to their businesses as enterprises move to public clouds, building on foundational best practices for multi-cloud network architecture and operations.

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The **Aviatrix Certified Engineer (ACE)** program is the first multi-cloud networking and security certification available to technical professionals and cloud practitioners. The ACE certification is designed for individuals who already understand basic networking concepts and prepares engineers and operations staff with the (1) working knowledge of native networking constructs in AWS, Azure, Google Cloud, and Oracle Cloud Infrastructure and (2) proficiency to build use cases and multi-cloud architectures using Aviatrix software.

Best Practices for Multi-Cloud Networking

1
Bring Networking Knowledge and Experience to the Cloud

Enterprise network engineers and architects bring unique skills to the table as their companies transition to public cloud environments. While many of the vendor specific configuration skills have radically changed, the fundamental networking knowledge still applies.

Help others understand that cloud networking goes beyond connecting to the cloud. Evolve your core networking knowledge and experience by embracing infrastructure as code, reach out to application teams and explore dynamic infrastructure optimizations that may have never before been possible.

2
Plan for Multi-Cloud

Your company may start in a single cloud, but will mostl likely need to expand–usually sooner rather than later. The business drives the number and types of clouds you are in, not IT. Multi-cloud network requirement arise for many reasons–new customer requirements, M&A integration, or simply that some applications operate better in one cloud versus another. Architect your network and network operations to leverage a multi-cloud network platform in your single cloud so when the business comes expecting multi-cloud support overnight, you can deliver.

3
Design in Network Security

Corporate and regulatory compliance teams have the power to derail your cloud network designs at the last minute. Engage them early, show them that your architecture will deliver end-to-end encryption for data in motion protection. Show that connection policies will enable secure network segmentation consistent across clouds and that infrastructure as code automation will reduce or eliminate human configuration errors that have caused issue in the past.

4
Maximize Operational Visibility and Control

When applications fail, the networking team finds itself guilty until proven innocent. Build in visibility and troubleshooting capabilities that allow you to work closely with application teams to dramatically reduce the mean-time-to-resolution for any issue. Build in operational visibility consistent across all your cloud platforms so that you don't need support teams specialized in the unique complexities of each cloud environment. Provide role-based access for first-level support, that enables troubleshooting and the controls required to mitigate problems.

5
Simplify and Automate

Focus on simplicity rather than mastering complexity. Leverage abstractions. Abstraction has been the foundation for the evolution of computer science for decades. Cloud networking in each cloud is uniquely complex in the way it offers basic networking services. Leverage a platform that allows you to abstract those complexities, use a common repeatable design across all of your cloud environments, and automate everything.

6
Application is King Mindset

While the network provides critical infrastructure, business leaders care about applications. Align anything and everything you propose, design, or deploy around how it benefits the company's critical applications and business. Describe your plans in terms of expedited time-to-market, reduced customer on-boarding time, improved customer satisfaction, minimized operational overhead and expense, and increased profit margin. Measure your impact, and you will find a seat at the business leadership table for the networking team in the cloud era.

[Expert Chat]

Deliver Measurable Business Impact

Do not bind your cloud network platform to a single cloud provider technology or architecture. A cloud network platform creates a cloud network abstraction layer that leverages and controls native cloud constructs and services. It then adds a superset of enterprise-class networking capabilities and operational visibility that operate Above the Clouds.™ This delivers compelling business value, including:

⋀ Multi-Cloud Optionality

Architect cloud networks to support existing single-cloud requirements with the option to easily expand. Having multi-cloud optionality allows Aviatrix customers to respond quickly to new customer demands or M&A integrations, which all consider a benefit.

> **We knew from previous experience that transit networking services offered by cloud service providers did not consistently offer the advanced networking and security controls or the ability to support the multi-cloud network architecture we envisioned. Aviatrix delivered both.**
>
> Dr. Michael Weber, Sr. Manager, Traffic Engineering, Splunk

⋀ Reduced Mean Time-to-Resolution

The Aviatrix platform's operational control, critical visibility, and troubleshooting capabilities increase application uptime and end-customer satisfaction.

> **CoPilot's extreme visibility helps customers find the 'needle in the haystack' to more easily recognize unusual network behavior and more quickly resolve network and application connectivity issues that, in the past, would have taken much longer to resolve.**
>
> Preston Gregg, General Manager North America, Viqtor Davis

The Aviatrix Controller delivers the central intelligence and multi-cloud control and is the foundation for delivering measurable economic value.

⋀ Reduced Operational Overhead

Intelligent central control, increased operational visibility and control, automation, and reduced staff skills gap all contribute to a significant reduction in operational overhead.

> **With the Aviatrix cloud network platform, we have a standardized, repeatable network architecture that supports our transit networking and other security requirements, which means our cloud network and security engineers have the luxury of not spending time on repeatable tasks and instead can focus on driving value for our business.**
>
> David Shinnick, VP and Principal Solutions Architect, FactSet.Reduced

⋀ Reduced Time-to-Market

The Aviatrix platform lets IT move at cloud speed, with a multi-cloud Terraform Provider that allows cloud networking to integrate easily into enterprise infrastructure as code automation and CI/CD pipelines. All with the result of increasing IT response time to the business.

> **When I learned that we could run our cloud network as code, I knew it would be a game changer for us. With Aviatrix, networking has finally entered the cloud era.**
>
> David Burris, Senior DevOps Engineer at Advance Auto Parts

Simplicity and Agility of Cloud. Operations and Security Required by Enterprises.

Simplify Enterprise Cloud Networking

The Aviatrix cloud network platform delivers the advanced networking, security, and operational visibility services required by enterprises, while maintaining the simplicity and automation of the cloud.

Advanced Multi-Cloud Network Transit

Aviatrix software enables enterprise IT to easily deploy a high-availability, multi-cloud network data plane with end-to-end and high-performance en-cryption, multi-cloud security domains, and opera-tional data IT teams need. Aviatrix Transit provides the intelligence to ensure network correctness, deliver self-healing capabilities, and deliver traffic engineering controls–functions that network archi-tects lack with basic transit constructs delivered by the CSPs.
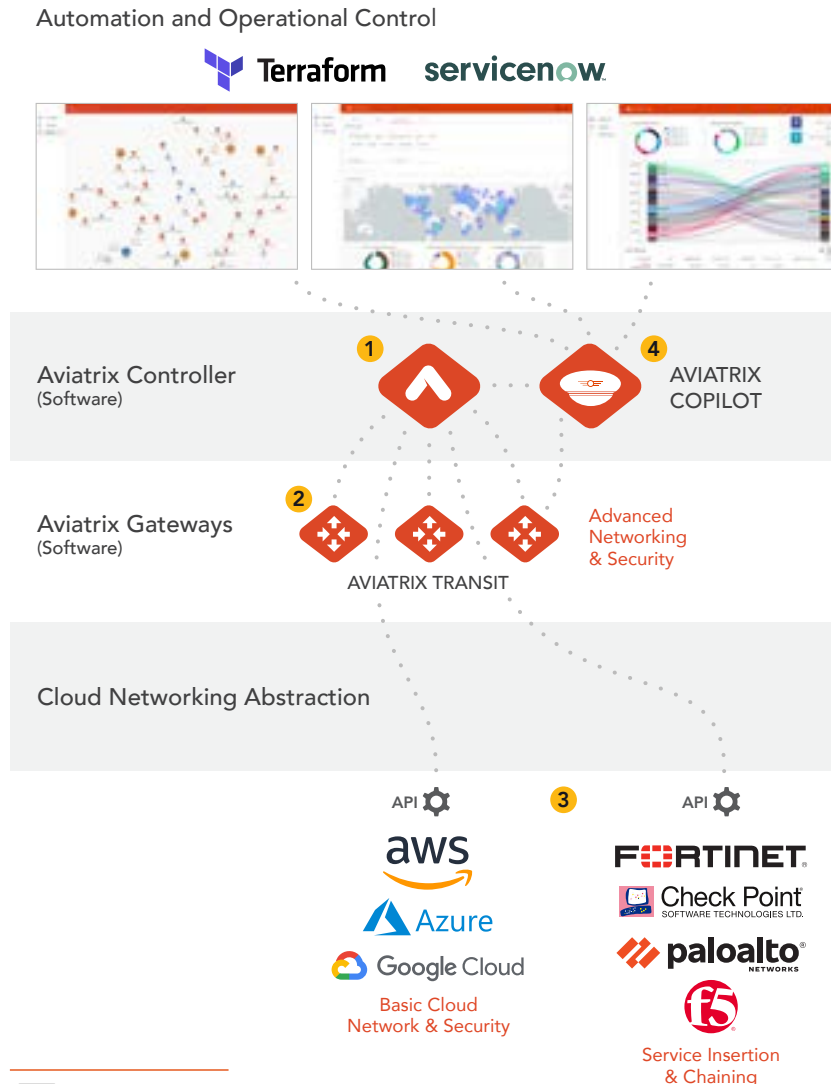
Enterprise-Class Operational Visibility

The Aviatrix platform brings day-two operational visibility not available from any cloud provider. This helps pinpoint traffic anomalies and suspicious behavior, resolve connectivity problems faster, and share network health metrics and dynamic network topology maps with staff and management.

Multi-Cloud Network Training

Aviatrix offers hands-on Aviatrix Certified Engineer (ACE) training and certifications to quickly bring your whole team up to speed on native AWS, Azure, and GCP networking, multi-cloud reference archi-tectures, and the Aviatrix cloud network platform.

The Aviatrix Cloud Network Platform

Automation and Operational Control

Terraform servicenow

Aviatrix Controller
(Software) **1** **4** AVIATRIX COPILOT

Aviatrix Gateways
(Software) **2** Advanced Networking & Security

AVIATRIX TRANSIT

Cloud Networking Abstraction

API **3** API

aws FORTINET

Azure Check Point SOFTWARE TECHNOLOGIES LTD.

Google Cloud paloalto NETWORKS

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Basic Cloud
Network & Security Service Insertion & Chaining

Watch Video

① Centralized Controller

The Aviatrix controller is the brain of the cloud network platform. The platform leverages the centralized intelligence and knowledge of the controller to dynami-cally program both native cloud network constructs and Aviatrix's own advanced services. Our single Terraform provider enables network and security Infrastruc-ture-as-Code automation across your multi-cloud environment.

② Gateways

Aviatrix gateways deliver advanced cloud networking and security services. Gate-ways are primarily deployed to deliver transit network and security services such as intelligent dynamic routing, active-ac-tive network high-availability, end-to-end and high-performance encryption and collect operational visibility data, but also for secure network ingress and egress filtering and external service insertion.

③ Native Cloud Constructs

The Aviatrix Controller leverages and controls native cloud constructs through public APIs, allowing the platform to be part of the cloud network, while adding critical network, security and operational visibility enterprises require.

④ Aviatrix CoPilot

Enterprise network operations teams must have deep visibility into network activity. CoPilot leverages the intelligence of the Aviatrix Controller and network flow analytics from Aviatrix Gateways to deliver multi-cloud visibility that is simply not available from any cloud provider.

Cloud Networking and Security Beyond Cloud Boundaries

Multi-Cloud Network Architecture

Aviatrix helps enterprise cloud network architects create a multi-cloud network architecture. It also offers a cloud network platform that provides the software and services required to plan, deploy, and operate a secure enterprise multi-cloud network.

High-Availability Networking

Aviatrix secure network transit's design includes active-active, high-availability, and redundant pathing. Pairs of Aviatrix Gateways, deployed in separate availability zones, establish a full mesh, multi-path connection that maximize both throughput performance and network availability.

Infrastructure as Code

The Aviatrix multi-cloud Terraform Provider leverages the multi-lingual capability of the Aviatrix Controller, which enables a single Terraform module to deploy repeatable network designs and security policies across all clouds. This allows cloud networking to integrate easily into enterprise infrastructure as code automation and CI/CD pipelines.

High-Performance Encryption

Standard IPSec encryption is limited to 1.25 Gbps. Aviatrix's high-performance encryption distributes processing across multiple cores and aggregates IPSec tunnels to achieve wire-speed encryption, up to 75 Gbps.

Multi-Cloud Network Segmentation

Some clouds enable the creation of security domains. Aviatrix extends secure network segmentation beyond cloud boundaries to enable multi-cloud security domains with consistent, centrally managed, global network segmentation, and connection policies.

Secure Cloud Ingress and Egress Controls

Aviatrix gateways offer both ingress and egress L4 and Fully Qualified Domain Name (FQDN) filtering. Centrally managed filter groups ensure consistent multi-cloud security for any cloud application communicating with Internet-based resources and services.

Multi-Cloud Network Service Insertion

Aviatrix Transit provides a secure point of access for network and security services such as next-generation firewalls, IDS/IPS, and SD-WAN cloud edge connections. Aviatrix gateways provide load balancing to scale-out connected services and ensure redundant and failover high availability.

Operational Visibility

Enterprise network operations teams must have deep visibility into network activity. Native public cloud networks are opaque. Even basic analytics must be obtained from multiple sources and require skilled human correlation to become actionable. Multi-cloud visibility is simply not available from any cloud provider.

Dynamic Network Mapping

Aviatrix leverages the controller's central intelligence and knowledge to dynamically generate and maintain an accurate multi-cloud network topology map. This includes all network resources and network configurations the controller manages. The map includes both native network resources and Aviatrix's secure transit and cloud ingress and egress control gateways.

FlowIQ – Intelligence Network Traffic Analytics

Aviatrix extracts detailed network traffic flow data from Aviatrix Transit infrastructure, including source, destination, port, and protocol filtering. This combined with additional metadata, such as latency and tagging, delivers never before possible multi-cloud flow inspection and global traffic heat maps.

AppIQ – End-to-End Application Path Analysis

Allowing network teams to work more closely with their application teams, AppIQ provides a detailed analysis of traffic and systems which form the path between two application endpoints, including gateway performance, network latency, route table analysis, security domains and more.

More

Additional advanced networking features include BGP propagation, traffic engineering, optimal path routing, and more.

Learn More

Try Aviatrix Today or Schedule an Architectural Review Session

Aviatrix is simple to deploy; our intelligent central controller is launched from cloud provider marketplaces and automates the deployment of additional network and security services, as required. Most customers launch and begin using Aviatrix services in an afternoon, easy to try and evaluate. We have experts available to help you.

Schedule Demo   **Schedule Meeting**

About Aviatrix

Aviatrix is a cloud network platform that brings multi-cloud networking, security, and operational visibility capabilities that go beyond what any cloud service provider offers. Aviatrix has over 450 enterprise customers who leverage it's proven multi-cloud network reference architecture to design, deploy and operate a repeatable network and security architecture that is consistent across public clouds. Aviatrix software leverages AWS, Azure, GCP and Oracle Cloud APIs to interact with and directly program native cloud networking constructs, abstracting the unique complexities of each cloud to form one network data plane, and adds advanced networking, security and operational features enterprises require.

Aviatrix.com

**CUSTOMER
FLIGHT PLANS**

THE JOURNEY TO MULTI-CLOUD

Watch Steve talk candidly with Aviatrix customers

Steve Mullaney teams up with innovative cloud architects and executives for an entertaining and in-depth look into the future of enterprise infrastructure in the cloud.

▶ **Watch the series**

Meet our CEO

Steve Mullaney is an industry visionary and proven leader. Ten years ago, Steve led Nicira and VMware to transform data center networking with SDN and network virtualization. Three years ago, Steve saw that the approaching next wave of enterprise digital transformation, the "all in" shift to public cloud services. He knew this would require networking as we knew it to transform as well. Two years ago, he took the helm at Aviatrix. Today some of the largest enterprise businesses in the world look to Steve as the industry's thought leader and have partnered with him and the team at Aviatrix to deliver the foundation of their next generation multi-cloud network infrastructure.

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