



Multi-Protocol Solution Enables Containerized 5G Infrastructure for Service Providers



5G DEPLOYMENT GOALS

Deploying 5G infrastructure will be service providers' most transformative technology transition to date, unlocking new opportunities and enabling digital transformation across all industries. Providers' primary goals during this transition include:

- **Fast deployment:** Cloud-native functions and apps can be quickly deployed, independently scaled, and easily upgraded
- **Greater efficiency:** Cloud-native applications consume up to 40% fewer resources compared with virtual machine-based software
- **Reduced operational cost:** Providers can program and automate operations across all edge cloud environments

F5 has a long history of helping wireless carriers deliver their applications.

As today's carriers transition to 5G technology, F5 offers a unique solution—including ingress/egress signaling control, security, and visibility—for supporting containerized infrastructures. The multi-protocol F5 solution integrates 4G protocols and infrastructure with a Kubernetes 5G standalone core. This enables service providers who are transitioning to 5G to reduce risk by maintaining their existing 4G services, customers, and billing systems.

Solution Overview

For most service providers, moving to a cloud-native 5G core is a significant architectural shift. It is paramount that these operators maintain interoperability across existing 3G and 4G protocols, applications, billing systems, policies, and infrastructure. F5 delivers this interoperability alongside high levels of control, security, and visibility across the entire cloud-native infrastructure.

The F5 solution for 5G architectures includes two primary components.

- **BIG-IP Service Proxy for Kubernetes (SPK):** the gatekeeper for traffic management, security and protocol interworking
- **Carrier-Grade Aspen Mesh (CGAM):** gives visibility into and management of cloud-native network functions (CNF)

CLOUD-NATIVE SCALABILITY AND SECURITY

Today's virtualized data centers are a big improvement over the bare-metal infrastructure of past eras, but virtualization is only one step on the journey to decreasing costs and increasing agility. The next major advancement comes in the form of the service-based architecture and cloud-native network functions (CNF).

The next-generation CNF architecture is created from virtual machines and offers all the benefits of today's virtualized infrastructures:

- Eliminates hardware dependency
- "Software-only" model for vendors' virtual network functions (VNFs)
- Automation and orchestration
- Multi-tenant: optimized shared infrastructure
- Deployment in weeks, not months

SOLUTION CAPABILITIES

BIG-IP Service Proxy for Kubernetes (SPK)

Signaling traffic management and control

- L4 load balancing: TCP, UDP, and SCTP
- L7 load balancing: Diameter, SIP, HTTP/2
- GTPcV2 load balancing
- BGP routing
- Rate limiting

Security

- Signaling firewall
- Topology hiding

Visibility

- Revenue assurance
- Statistics and analytics

Carrier-Grade Aspen Mesh (CGAM)

Traffic management and policy control

- Fine-grained traffic control
- Visibility of east-west traffic

Security

- Mutual Transport Layer Security (mTLS)
- Policy management
- GPP-compatible certificate authority

Observability

- L7 metrics, logs, and traces
- Packet capture for troubleshooting and lawful intercept

Additionally, CNF advances the state of the art by delivering a truly cloud-native, microservices-based architecture for 5G and radio access networks (RAN). With a cloud-native, containerized 5G core architecture, service providers will be able to achieve new levels of operational automation, flexibility, and adaptability. Using industry-leading BIG-IP functions and capabilities, the F5 solution delivers fine-grained traffic management and strengthens security within and between clusters.

While Kubernetes is not designed specifically for service providers, this containerized technology does offer providers a wide range of benefits. F5 bridges this gap with a targeted solution that brings critical carrier-grade capabilities to the Kubernetes environment.

MAXIMUM VISIBILITY AND CONTROL WITH BIG-IP SPK AND CGAM

Comprehensive container security requires both “north-south” traffic (client-to-server, between the data center and the rest of the world) and “east-west” traffic (server-to-server, within a data center or cloud) to be secured. BIG-IP SPK enables high levels of visibility into and management of both 4G and 5G signaling traffic at container ingress/egress. At the same time, CGAM delivers traffic management and security within Kubernetes clusters, including unique packet-capture capabilities that are critical to smooth CNF operations.

Carrier Grade Aspen Mesh solves a common problem facing many providers: a lack of visibility into traffic within pods. In these cases, de-encrypting traffic for inspection is one issue, but the bigger issue is that intrapod traffic doesn’t necessarily cross a switch where standard inspection would take place. With Kubernetes, some traffic will never hit a dedicated switch or tap. When one container talks to another container on the same machine, the packets they exchange are virtual—simple bytes in RAM that the system shuffles between containers.

CAGM removes these barriers to visibility with unique packet-tapping capabilities that give service providers full packet visibility for troubleshooting and [meeting lawful intercept requirements](#). With CAGM, providers can operate their networks effectively, securely, and within regulatory and compliance standards.

Figure 1: F5 Service Proxy for Kubernetes and Carrier-Grade Aspen Mesh deployment option.

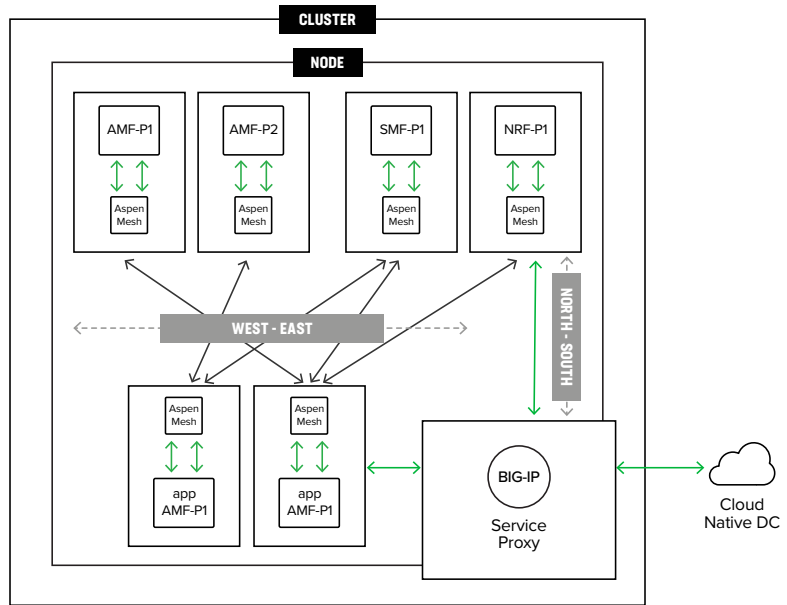
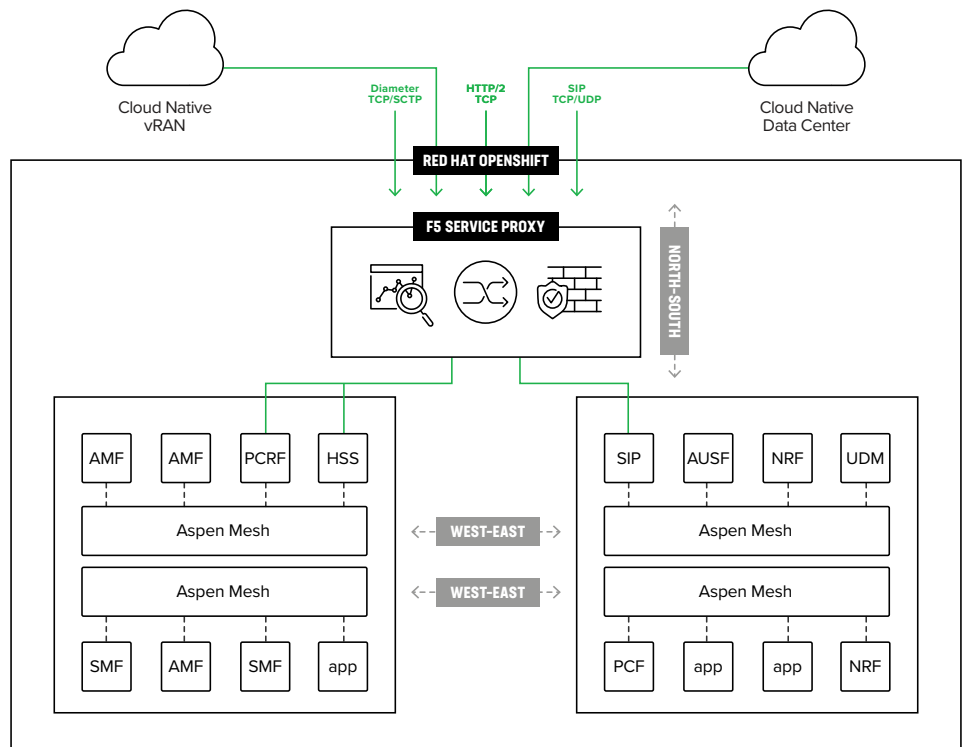


Figure 2: F5 Advanced Telco Protocol Support with F5 SPK and Aspen Mesh.



BIG-IP SPK AND CGAM
ARE NOT JUST 3GPP
FUNCTIONS, THEY
ARE PART OF THE
INFRASTRUCTURE.

Summary

F5 offers a cloud-native infrastructure solution to help service providers gain visibility, control, security, and scale for 5G network deployments. This solution helps reduce costs and complexity across the core, edge, and far edge of 5G networks while also ensuring smooth interoperability with 4G and legacy networks.

Together, BIG-IP Service Proxy for Kubernetes (SPK) and our Carrier-Grade Aspen Mesh (CGAM) solutions provide traffic visibility both into and within a Kubernetes cluster to help providers dynamically scale their 5G infrastructures.

Learn more

- [BIG-IP Service Proxy for Kubernetes \(SPK\)](#)
- [Carrier-Grade Aspen Mesh \(CGAM\)](#)
- [5G Infrastructure Solution Guide](#)
- [Blog: How Cloud-Based Infrastructure Enables 5G Innovation](#)

