# THE CLOUD-NATIVE 5G INFRASTRUCTURE OF THE FUTURE IS HERE

**Getting to 5G.** Service providers are facing an enormous challenge: they must start working now to deliver a 5G standalone core architecture, and they should do this faster than their competitors—even though a 5G deployment requires a complex, multi-year effort. F5 is now able to offer a solution that enables service providers to achieve their 5G vision with F5® BIG-IP® Service Proxy for Kubernetes (BIG-IP SPK), and Carrier-Grade Aspen Mesh™. This document provides a brief overview of a service-based architecture-driven model for 5G infrastructure and describes how F5's solutions enable that model.

## A SERVICE-BASED ARCHITECTURE PROVIDING DYNAMIC RESOURCE ALLOCATION

Any standalone 5G network will have a 3GPP defined service-based architecture (SBA) in its core. 5G is about applications; to make this possible, the 5G network runs on an SBA that is designed to optimize network resources to provide optimal service performance. The SBA consists of a variety of network functions which are self-contained, independent, and reusable. It provides dynamic network elasticity and scalability, allowing capacity to be provisioned throughout the network in a very granular way.

The new network core is less about speed and latency and more about the provision of new services and operational applications. The network will enable the dynamic allocation of resources to provide the right service levels and network availability needed for each use case. The network will support its enterprise customers with 4th Industrial Revolution applications provided by new capabilities such as Internet of Things (IoT), virtual reality, artificial intelligence, and machine learning.

## CLOUD-NATIVE IS THE KEY TO 5G

Service providers can create an SBA using a microservices-based, cloud-native solution. A cloud-native solution is an evolution of a virtualized, VM-based network. A cloud-native solution provides much more granular provisioning of capacity. This is critical for 5G because it allows providers to provision to average rather than peak capacity for optimal efficiency. Cloud-native network functions (CNFs) have the speed and flexibility to enable this solution, and, as a cloud-native solution, will mitigate vendor lock-in by the big mobile network equipment providers and allow the selection of vendors based on best-of-breed functionality and price.

Compared to a virtual network, a cloud-native network managed with service mesh will provide:

- Faster deployment: cloud-native functions and apps can be independently scaled, upgraded, and deployed
- Greater efficiency: cloud-native applications consume up to 40% fewer resources, reducing inefficiencies in server usage compared with virtual machine-based software
- Reduced operational cost: automation and programmable operations across all edge cloud environments help reduce overhead

# THE F5 SOLUTION

F5 is now able to offer a solution that enables this SBA based 5G vision. The F5 solution includes two components:

## BIG-IP Service Proxy for Kubernetes

Kubernetes is not designed specifically for service providers and lacks the ability to natively support some network protocols. F5's solution, BIG-IP SPK, brings critical carrier-grade capabilities to a Kubernetes environment. It enables service providers to create a bridge from their existing 4G networks to a cloud-native 5G core network. BIG-IP SPK provides 4G signaling traffic management, visibility, and security at container ingress (North/South) into the 5G core Kubernetes clusters. Running on Red Hat OpenShift, it can also proxy service provider-specific protocols, such as 5G HTTP/2-REST, Diameter, SIP, GTP, and SCTP.

## Carrier-Grade Aspen Mesh

The Carrier-Grade Aspen Mesh solution provides observability, security, and traffic management for the (East/West) traffic flowing within and between Kubernetes clusters, providing the tools service providers need to ensure network security and comply with governmental requirements. Because it sits independent of CNFs, service providers can own and manage their own service mesh, allowing them to ensure the performance and reliability of their most important asset—the network.

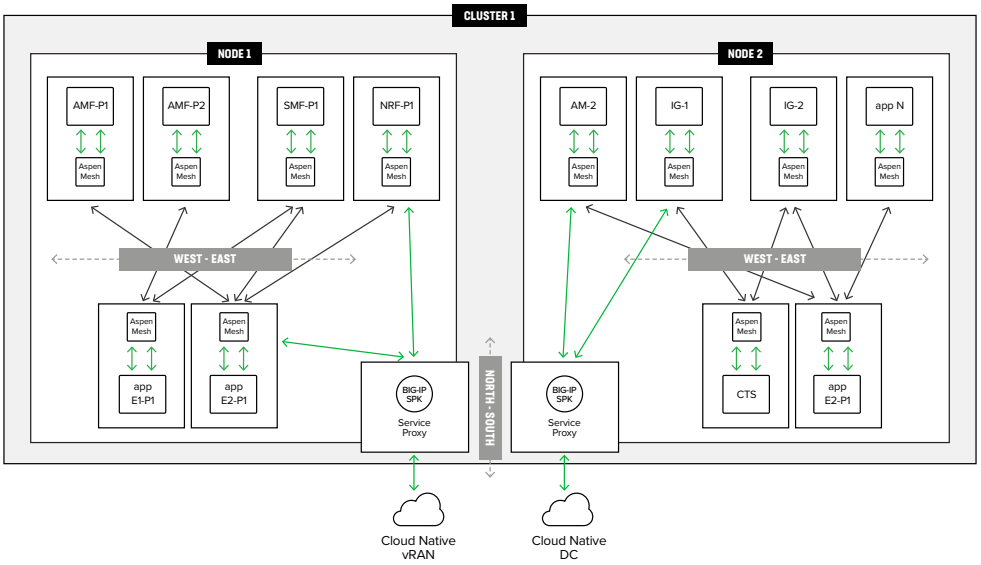


**Figure 1:** F5 BIG-IP SPK and Aspen Mesh managing Kubernetes node ingress traffic and intra-node traffic.

## A COMMON ARCHITECTURE FROM CORE TO FAR EDGE

A containerized, microservices-based architecture is highly scalable. It can scale from a small number of very large cell sites in the core to a very large number of smaller cell sites at the edge—but this is only achievable with specialized functionality delivered by software. Deploying from core to far edge brings design consistency to the network and significantly reduces management and operational costs.

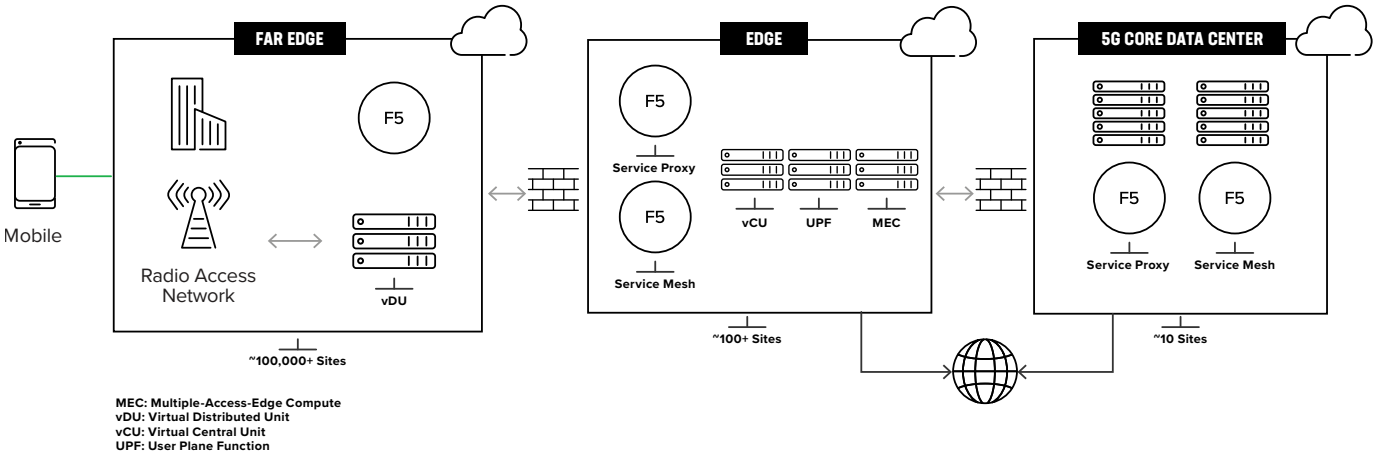


**Figure 2:** Common architecture across core, edge, and far edge.

## CONCLUSION

Deploying and operating the next generation 5G core will enable the full potential of innovative and advanced 5G solutions, leading to greater scalability and efficiency in the network. A higher level of operational autonomy in the 5G core design will be critical for the next generation of services that will be enabled by new network technologies to serve consumer and enterprise customers. Engaged with global 5G leaders, F5's unique BIG-IP SPK and Carrier-Grade Aspen Mesh are critical components that help turn the promise of 5G into a reality.

**To learn more, contact your F5 representative, or visit f5.com.**