F5 Reference Architecture for Cisco ACI

Today's businesses face complex challenges to stay efficient and competitive. Together, F5 and Cisco enable organizations to dramatically reduce time to value on investment, decrease operational risk, and react faster to new and unexpected changes.

White Paper

Introduction

The speed of business is increasing and the demands placed on organizations to remain efficient and competitive are growing in complexity, time consuming, and multifaceted.

Application and service delivery is no longer linear or predictable. Employee productivity and customer expectations are driving the requirement for faster provisioning of new applications and services. This is made increasingly difficult to address with rapid fluctuations in demand from both planned and unplanned conditions. Furthermore, with virtualized platforms increasing application mobility, and applications often spanning physical locations, organizations are forced to adopt a new operational model—Fast IT.

Realizing these new business expectations requires a reduction in application deployment delays, and the elimination of rigid architecture and silo'd infrastructure that is inhibiting innovation.

Business problem

Traditional networks comprise hundreds of devices providing a robust set of services ranging from routing and switching to application performance, availability, security, identity and access control, and mobility. Individually these devices bring with them management isolation, which leads to operational overhead, increased likelihood of failure, and human latency.

Manually configuring these devices and services for each and every application consumes a considerable amount of time for both network and operations teams.

However, by shifting the burden of provisioning and configuration to scripts, templates and orchestration systems, network services can be deployed in less time and with greater consistency. Achieving these better outcomes and reducing revenue loss due to substantial delays require a new strategy.

Software-Defined Networking (SDN) brought the promise of integration and automation through controllers responsible for centralized deployment of configuration. However, the first generation of SDN focused only on connectivity and fell short of expectations for enterprise-grade production ready environments. It delivered only basic networking functions across low-level devices and left the many application delivery services, required to meet live deployment policy, out of the picture. The promise of reducing human latency was unfulfilled.

While falling short of expectations, “classic SDN” had the right intentions based on delivering:

- Time to value
- Time to react
- Reduced risk

However, by leaving the majority of network services out of early designs, SDN, as a production-ready solution, was tried and found wanting. As a result, many of the lengthy deployment delays as a consequence of human latency remained.

Business solution

Better alignment of delivery architecture to services delivered requires an application-centric, policy-driven approach—one that brings to the network “app centricity” for faster time-to-value on investment and a more responsive delivery platform for existing services. Only from a policy that is inclusive of all networking services—low level switching and routing, and application services for performance, availability, and security—can organizations begin to operationalize the network.

Operationalize the network with SDN

By shifting the burden of provisioning and configuration to scripts, templates, and orchestration systems, network services can be deployed in much less time and with greater consistency. To enable this, network and infrastructure devices must be programmable and enable configuration and provisioning via open APIs at a minimum.

Application service templates can further reduce risk and improve time to market by encapsulating common tasks into an executable package easily deployed with a single command. Using open APIs further enables integration with network automation and orchestration systems, such as Cisco’s Application Policy Infrastructure Controller™ (APIC). This provides an end-to-end network service-provisioning model in which app deployments can be supported in hours or days instead of weeks or months.

Improve time to value

Delays in realizing value on investment are costly. Organizations are trying to improve productivity with new tools and services while addressing employee mobility demands. They are also competing to release functionality to address customer demand and increase their competitive advantage. Consequently, the speed in which an organization’s customers and employees can realize the value of new investments is critical to remaining efficient and competitive. However, reducing deployment times requires an all-inclusive approach.

Faster time to react

A software-defined approach, leveraging integration and orchestration, drives improvement in new and existing deployments. Static platforms aren't suitable for today's fluctuating demands. Systems must be able to alter their capabilities to match the varying workloads of deployed applications. They must take instruction to match unplanned demand—be it from sanctioned use or an attack—and do so based on centralized, integrated policy. Such a variable platform lends itself to an architecture of mean capabilities, moving away from overprovisioning for worst case scenarios—a methodology paramount of inflexible implementations.

Often left out of the initial consideration is that not all organizations have the luxury of green-field deployments: a new deployment void of legacy systems affecting design goals. As a result, solutions must support a platform for co-existing environments—legacy and evolved—and a simple and reliable migration path between the two, often referred to as a mixed-mode.

Decreased risk

In addition to the human latency of configuring isolated platforms is the element of human error. Troubleshooting hundreds of device configurations takes time and, for production readiness, requires 100 percent precision. Through the implementation of centralized policy management of integrated networking technologies, the risk of human error can be vastly reduced through the elimination of repetitive tasks.

Technology solution

F5 and Cisco are solving the human latency problem. With an app-centric approach that integrates lower-level networking services and application services together, organizations can improve time to value, time to react, and reduce risk.

Delivering applications with SDN architectures requires more than the packet-oriented delivery capabilities provided by L2–3 and overlay networking SDN technologies. To deliver and secure applications, a network built using SDN principles must be able to act based on the constantly changing state of flows (e.g. TCP), the application-layer messages transiting the network, and the semantics of communications. F5's complete portfolio of L4–7 application and gateway services extend the capabilities available to architects who are designing and implementing their networks using SDN architectural principles.

Beyond connectivity and applications services, F5 also brings gateway services to the mix allowing for the simple coexistence and migration of applications across both legacy and new architectures.

> "First generation SDN solutions don't remove the problem, they move the problem
>
> —Soni Jiandani, SVP, Marketing of Insieme Business Unit, Cisco

Software flexibility with the scalability of hardware performance

Cisco Application Centric Infrastructure™ (ACI) enables Fast IT by providing a common policy-based operational model across the entire ACI-ready infrastructure, drastically reducing cost and complexity. This system-based approach simplifies, optimizes, and accelerates the entire application deployment lifecycle across data center, WAN, access, and cloud. In doing so, it empowers IT to be more responsive to changing business and application needs, enhancing agility and adding business value.

Cisco ACI for the data center is an innovative, highly secure architecture that delivers centralized application-driven policy automation, management, and visibility of physical and virtual networks. It is optimized for tomorrow's emerging architectures as well, supporting an "application-anywhere" model with complete freedom of application movement and placement.

Application Centric Infrastructure (ACI) in the data center is a holistic architecture with centralized automation and policy-driven application profiles. ACI delivers software flexibility with the scalability of hardware performance.

Key characteristics of ACI include:

- Simplified automation by an application-driven policy model
- Centralized visibility with real-time, application health monitoring
- Open software flexibility for DevOps teams and ecosystem partner integration
- Scalable performance and multi-tenancy in hardware

The future of networking with ACI is about providing a network that is deployed, monitored, and managed in a fashion that supports DevOps and rapid application change. ACI does so through the reduction of complexity and a common policy framework that can automate provisioning and managing of resources.

Source: http://www.cisco.com/c/en/us/solutions/data-center-virtualization/application-centric-infrastructure/index.html

F5 Software-Defined Application Services

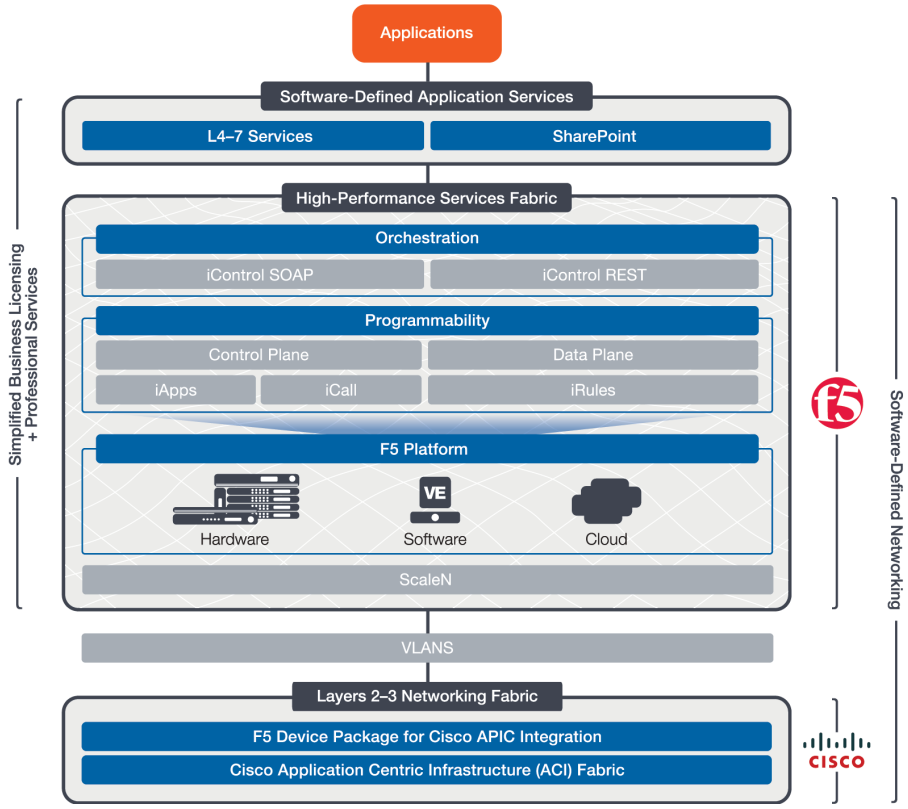
Network virtualization must be accompanied by changes in the provisioning of application delivery services. The deployment of Application Delivery Controller functions must be based on data center automation and the adoption of cloud computing principles. In the case of availability, for instance, the standard high-availability pair today mitigates failure at the device or instance level—not the application level.Modern architectures and data center models require a more flexible approach to application services such as availability, one that better aligns with trends toward micro-services and API-based architectures.

More broadly, given increased user mobility, an expanding "Internet of Things," and the reality of HTTP superseding TCP as the de facto transport protocol, service providers and organizations are reevaluating traditional architectural principles. They are determining how to best move forward with application delivery service provisioning that can keep up with, or at least catch up to, industry trends.

F5 Software-Defined Application Services™ (SDAS) is the next-generation model for delivering application services. SDAS takes advantage of F5 innovations in scalability models, programmability, and an intrinsic decoupling of the data and control planes to create a unique application service fabric. This fabric is capable of extending the benefits of F5 application delivery services to all applications, irrespective of location.

SDAS is the first fabric-based application delivery and control system. It enables service injection, consumption, automation, and orchestration across a unified operating framework of pooled resources. SDAS delivers:

- **A fabric-based solution.** F5 ScaleN™ technology powers an elastic, all-active application service fabric that dramatically lowers the cost of delivering application services by increasing utilization and service densities.
- **Automation and orchestration.** Intelligent service automation and orchestration APIs reduce OpEx and fill a critical gap in software-defined data center and network architectures. As a result, organizations with SDAS can streamline application deployment and support continuous delivery.
- **A unified operating framework.** A rich, extensible catalog of application services empowers application owners to address performance, security, and availability concerns in cloud, data center, service provider, and managed environments. The SDAS fabric provides a foundation for building elastic application services.



F5 and Cisco partnership

Through a committed partnership and management API integration, F5 and Cisco enable organizations to dramatically reduce time to value on investment, decrease operational risk on configuration deployments and alterations, and speed time to react toward both planned and unforeseen circumstances.

The integration of F5's mature control plane API into Cisco APIC creates, for the administrator, a single point for network infrastructure deployment and configuration. As the result of F5 and Cisco working together to create an app-centric network policy approach, organizations have a simplified, integrated application delivery stack.

Through management API integration, F5 and Cisco enable organizations to embrace Fast IT and dramatically reduce time to value on investment, decrease operational risk on configuration deployments and alterations, and speed time to react to unforeseen circumstances.

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