



F5 Rapid Start System - A Full-Stack Software Platform for Demanding Applications

As the world shifts towards digital transformation, applications and functions are being deployed across distributed cloud architectures to enable this transformation and improve flexibility, simplify operations, and reduce costs. Supporting this transition, F5 Rapid Start System simplifies the deployment of high-performance software with hardware acceleration, making it ideal for demanding workloads.



KEY BENEFITS

Quickly deploy and go to market

Pre-built, full stack solutions accelerate deployment speed and help you get to market faster.

Maximize network flexibility with software

Disaggregated and virtualized software deployments ensure maximum operational agility and flexibility.

Boost throughput performance and scalability through hardware offload

Offload resource-intensive functions such as DDoS, CGNAT, L4 firewall and SSL/TLS cryptography to high-performance hardware components like FPGAs, SmartNICs, and cryptography processors to increase throughput performance by up to 33% (and up to 500% for SSL/TLS).

Achieve predictable and optimized performance

Solutions are created by F5 engineers and are pre-validated and tested for optimal performance.

The Transition to a Hybrid, Distributed Cloud World

While the shift towards digital transformation has led to an increased reliance on cloud-based solutions, it does not mean we will reach a fully cloud-based, software-only network anytime soon. Evidence suggests that the future will be a hybrid, multi-cloud world in which on-premises solutions play an important role. The F5 2022 State of Application Strategy (SOAS) Report¹ states that “hybrid architectures, including on-premises data centers and XaaS offerings, are not going away, while applications and workloads will be increasingly containerized and mobile. That means complexity is here to stay, too.” The future enterprise will be a mixture of private and public cloud solutions alongside on-premises solutions where it makes sense. In fact, the SOAS report finds that enterprises are repatriating cloud-based applications back to on-premises data centers. According to the report, 92% of organizations currently host apps in on-premises data centers, and 37% of respondents have repatriated apps back to on-premises data centers, with another 30% planning to do so.

For all the benefits of software solutions, high performance is still a critical requirement. The same report offers a startling observation that “performance matters,” and many survey respondents (over 75%) admitted that—given a choice—they would turn off security measures to improve performance. Half would do so even for performance improvements under 50%. Clearly performance is still king. Solutions that combine the flexibility of software with the high-performance of hardware and can operate on-premises or in the cloud are therefore highly prized.

Service Provider Challenges

Today, service providers are facing a number of challenges as they seek to evolve their networks to a cloud-native and ultimately, for mobile networks, a 5G network with a service-based architecture. These challenges include the need to scale networks to handle growing traffic, particularly video content. They must also ensure that security is built into solutions, even as their attack surface expands. And while software and cloud-native solutions are of great importance, service providers must also maintain high network performance.

They must find a way to simplify the complexity of sizing and scoping software solutions and selecting the right hardware to maximize the efficiency of their solutions—thus containing costs. The process of assembling, validating, and managing software solutions along with the hypervisor, NICs and server takes considerable time and effort, while requiring skillsets that are scarce and in high demand.

KEY FEATURES

Extensive feature support across all F5 software solutions

Support for F5 BIG-IP VE and the F5 application suite (including BIG-IP® Local Traffic Manager™, BIG-IP® DNS, BIG-IP® Advanced WAF®, APM (Access Policy Manager), AFM (Advanced Firewall Manager), BIG-IP® Policy Enforcement Manager™, and BIG-IP® Carrier Grade NAT), as well as F5® BIG-IP® Next™ CNF software.

Improve video and financial market segment performance

Achieve ultra-low latency throughput of 3–5 microseconds as the SmartNIC eliminates the need for a switching function.

Enhance performance with hardware offload

Offload CPU-intensive functions such as CGNAT and DDoS mitigation to high performance hardware components like FPGA-enabled SmartNICs and specialized crypto processing units to increase performance.

Enhance trading with FIX protocol support

Support for Financial Information eXchange (FIX) protocol, a widely-used standard for disseminating price and trade information among investment banks and broker-dealers.

While juggling these requirements, operators are seeking ways to easily transition to cloud-native networks. Automation is seen as a key enabling factor in this process, as it can simplify operations and management of new applications and will help provide critical visibility into the growing number of applications that are deployed. However, making this transition can be difficult—especially when automation and orchestration skills amongst employees are limited.

Flexibility of Software and Performance of Hardware

F5® Rapid Start System appliance is a production-ready full stack solution designed for service providers and large enterprises. It consists of F5® BIG-IP® Virtual Edition (VE) software, hypervisor, commercial-off-the-shelf (COTS) server, FPGAs, and SmartNIC cards, and is available as a single-rack unit device. This solution is designed to be highly space efficient and compact. High initial throughput of 150 Gbps and 300 Gbps are available—with higher performance solutions on the horizon. It is ideal for deployment in private clouds, colocation facilities, and on-premises sites in the data path, such as the datacenter, edge locations, or the S/Gi-LAN/N6.

The system offers a pre-built software platform that simplifies the path to virtualized infrastructure, maintains the performance and scalability of dedicated appliances, and affords the extensibility potential for operating F5's complete product range. Designed to provide maximum software flexibility and performance, it takes full advantage of disaggregation and virtualization. F5 Rapid Start System offers customers the flexibility of a virtualized solution, realizing the operational cost benefits associated with cloud-native solutions. It supports BIG-IP VE software and will take advantage of F5OS, F5® BIG-IP® Next™ Cloud-Native Network Functions (CNFs) and F5® Distributed Cloud Services in the future.

With a focus on delivering ultra-low latency experiences, Rapid Start System provides significant performance through functional offload to pre-integrated hardware. It employs FPGA and SmartNIC technologies to optimize the performance of user-defined functions via efficient hardware offload. Rapid Start System's high performance, ultra-low latency components provide optimized user experiences and the scalability required for growing app/service usage. Additionally, it improves performance for CPU-intensive functions such as CGNAT, Distributed Denial of Service (DDoS) protection, and crypto processing.

The table below (Figure 1) highlights the BIG-IP VE performance improvements of various CPU-intensive functions when offloading to Intel SmartNIC and Quick Assist Technology (QAT) components.

Figure 1: Cryptographic processing and SmartNIC hardware acceleration performance improvements.^{2,3}

Function	CPU Utilization Reduction	Gbps Throughput Performance Improvement*	Attack Size Mitigation*
CGNAT	95%	30%	N/A
L4 Acceleration	95%	33%	N/A
DDoS Mitigation	70%	20%	40GB – approx. 20 times greater
SSL/TLS cryptographic processing	44%	~200%	N/A

*With a single Intel® FPGA N3000 SmartNIC® and compared to VE software with 8 vCPUs/physical cores

It also provides ultra-low latency of 3–5 microseconds because the SmartNIC does not require a switching function. This makes it suitable for situations where ultra-low latency is required. For example, its support for the Financial Information eXchange (FIX) protocol—an information and data protocol used to disseminate price and trade information among investment banks and broker-dealers—makes it suitable for critical deployments within the financial and securities market segment.

HYBRID ARCHITECTURES, INCLUDING ON-PREMISES DATA CENTERS AND XAAS OFFERINGS, ARE NOT GOING AWAY, WHILE APPLICATIONS AND WORKLOADS WILL BE INCREASINGLY CONTAINERIZED AND MOBILE. THAT MEANS COMPLEXITY IS HERE TO STAY, TOO.¹

Rapid Start System simplifies operations for customers by eliminating the need to individually procure software, hypervisors, servers, and hardware accelerators, as well as the validation and testing required every time a software version or hardware component is changed. Components are pre-validated and tested continuously every time a software version or hardware component is modified. F5 is the initial single point of contact if issues arise and will help expedite the troubleshooting process. Customers who are familiar with the F5 BIG-IP VE software solution will see dramatic engineering simplification while still enjoying the power and performance of a dedicated hardware platform.

AUTOMATABLE, MANAGEABLE, AND READILY AVAILABLE

The Rapid Start System can be fully automated and managed through the F5® Automation Toolchain which enables efficient provisioning and configuration of application services while abstracting away complexity and minimizing errors. Moving forward, the F5® Distributed Cloud Console—a globally accessible portal for managing distributed apps and infrastructure—will be integrated, allowing full management of a Rapid Start System deployment.

Each element of Rapid Start System is readily available, even in today's constrained supply chain environment, helping accelerate procurement timelines and ensuring that project deadlines are met.

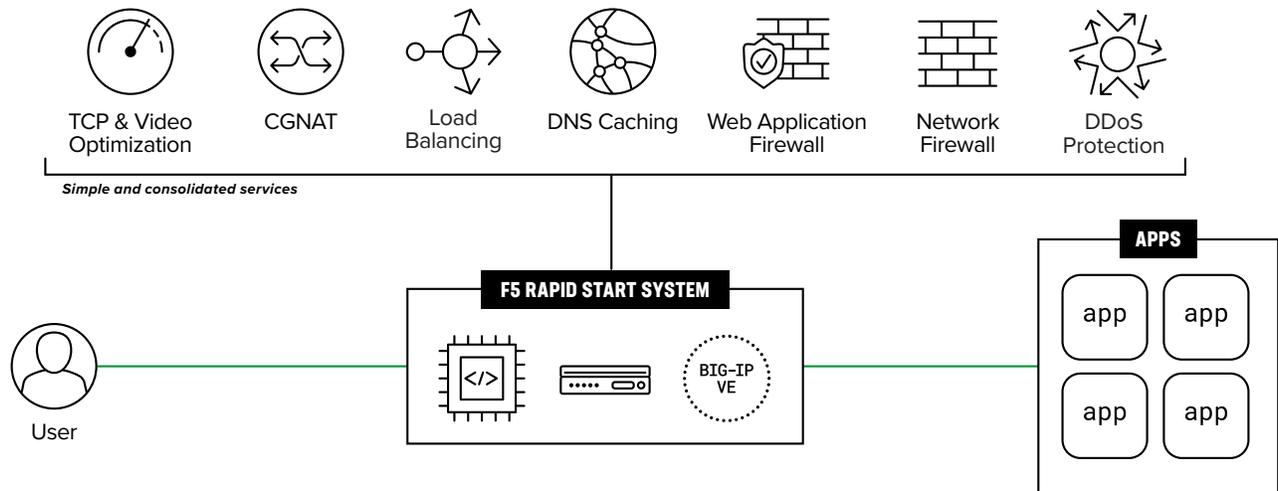


Figure 2: Rapid Start System operates as a consolidated solution for N6 and S/Gi-LAN.

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Where Can Rapid Start System Be Deployed?

Rapid Start System can be used as a high performance compact device by cable, fixed-line, and mobile network operators, or by large enterprises. It can be deployed to enable services in the data path between the users and the servers in the data center or in the N6 LAN between the UPF and the internet (known as the S/Gi-LAN in 4G networks). These services can include firewalls, DDoS protection, DNS, caching, TCP optimization, and video optimization, among others. The most efficient deployment of these services is to consolidate them into a single solution if the device's processing performance is sufficient. Rapid Start System is a compact device that can perform these functions with its onboard SmartNICs (see Figure 2).

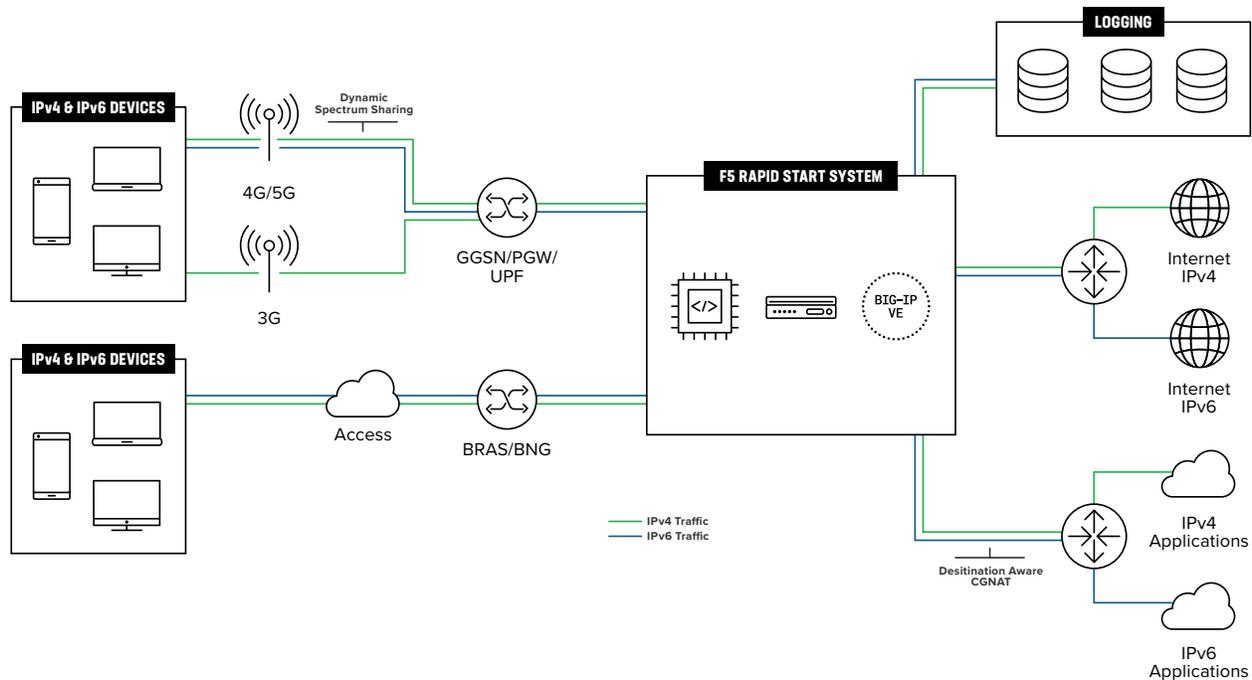


Figure 3: Rapid Start System operates as a dedicated high-performance CGNAT device.

Alternatively, the system can support high levels of throughput for any one of these features that specifically require high levels of processing performance due to its offload to the SmartNICs. For example, a likely deployment might be for a Gi Firewall, DDoS, or CGNAT (see Figure 3).

Conclusion

To better support service providers' evolution to a digitally transformed, cloud-native world, F5 Rapid Start System simplifies the deployment of software with high-performance hardware acceleration. This makes Rapid Start System ideal for high-performance workloads like CGNAT or firewall/DDoS mitigation. Rapid Start System is fully automated and easily managed.

To learn more about, [contact F5 Sales](#).

RAPID START SYSTEM CAN SUPPORT HIGH LEVELS OF THROUGHPUT FOR SPECIFIC FEATURES THAT REQUIRE HIGH LEVELS OF PROCESSING PERFORMANCE DUE TO ITS OFFLOAD TO THE SMARTNICs. FOR EXAMPLE, A LIKELY DEPLOYMENT MIGHT BE FOR A Gi FIREWALL, DDOS, OR CGNAT.

¹ F5 2022 State of Application Strategy (SOAS) report, found at <https://www.f5.com/c/global-2022/report/2022-soas-global-report-fulfillment?>

² Augment Performance in Virtualized Environments With BIG-IP VE for SmartNICs, found at <https://www.f5.com/pdf/solution-guides/augment-performance-virtualized-environments-with-big-ip-ve-for-smart-nics.pdf>

³ F5 Accelerates Cryptographic Processing with Intel® QAT, found at <https://www.f5.com/pdf/white-papers/f5-accelerates-cryptographic-processing-with-intel-qat-white-paper.pdf>

