



# F5 and Mellanox Enable High Performance VNFs for Virtualized and 5G Networks

## EXECUTIVE SUMMARY

In the face of ever-growing traffic volume and complexity—as well as the increasing pressure to reduce costs, drive profitability and grow the business faster—networks continue to evolve. The adoption of new networking technologies to drive 5G adoption is the next evolution for service providers. This includes a paradigm shift to virtualize carrier-grade networks to increase the speed of delivery, automate application services and support emerging critical requirements for managing performance and security.

F5 and Mellanox have teamed up to provide an end-to-end solution for 5G enablement that helps ease the transition from 4G networks to 5G cloud and software-defined architectures utilizing virtual application delivery platforms. This provides for an agile, flexible, and efficient way for service providers to deploy advanced application and security services. Working together, F5 and Mellanox can boost performance to near-line rate to maximize investments in current 4G networks, while optimizing infrastructure to enable the scale required to deploy 5G networks.

## NETWORK EFFICIENCY

5G is allowing carriers to handle an exponential increase in data usage tied to the creation of new applications and services. Examples include self-driving cars, smart homes, artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and more. Working with F5 and Mellanox, service providers will feel confident in rapid deployments with simple out-of-the-box native integration with leading public and private cloud providers, colocation interconnects and containerized environments. This compatibility and platform flexibility saves time and maximizes efficiency to achieve the most expedient ROI and unrivaled TCO on a next-gen 5G network build-out.

## HIGHLIGHTS

- Increased deployment agility
- Optimize F5 application and security services
- Achieve automation and orchestration in cloud architectures
- Scale and optimize existing 4G and new 5G networks through F5 network functions virtualization (NFV) offerings
- Highest bare metal DPDK packet rate of 148 million packet per second.
- Leverage Mellanox OvS offload (ASAP<sup>2</sup>) for up to 5X performance improvements with services like DNS
- NFV functions include: GiLAN/N6 Firewall, WAF, DDoS, DNS, CGNAT, Traffic Steering, Policy Enforcement, SSL/TLS, TCP and Video optimization, Diameter)



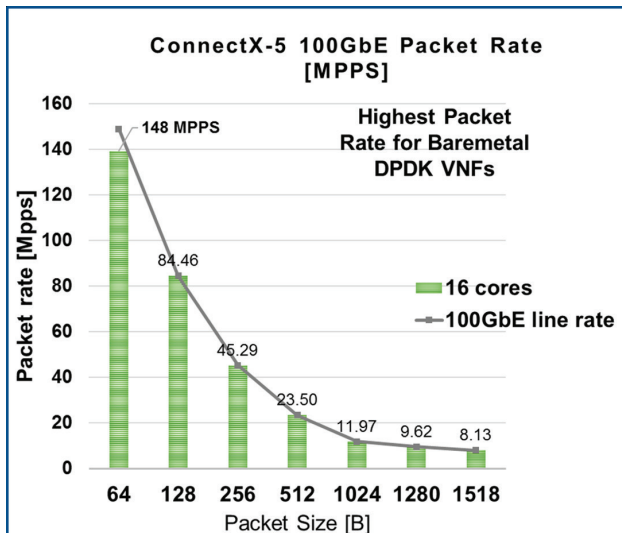
## OVERCOME NETWORK PERFORMANCE PENALTIES

While Virtualization and Cloud-based technologies improve scalability, agility, and operational simplicity, the hypervisor overhead imposes significant performance penalties by utilizing host CPU cycles for processing networking traffic. This problem becomes more critical as bandwidth increases to 25/40/50/100 and 200Gb/s which drives higher CPU consumption and leads to server proliferation.

To solve this challenge, higher performance and increased throughput are enabled through the support of the Mellanox's flagship ConnectX family of network adapters, including 100Gb and 200Gb Ethernet. ConnectX network adapters deploy intelligent networking offloads and in doing so, free CPU cycles which significantly improves workload performance.

## ACCELERATED PACKET PROCESSING

Mellanox and F5 support Data Plane Development Kit (DPDK) and SR-IOV BIG-IP optimized drivers to help process packets faster. DPDK is a software acceleration technique comprised of a software library and drivers which reduce CPU overhead caused by interrupts sent each time a new packet arrives for processing. Instead, DPDK implements a polling process for new packets with a key benefit of significantly improving processing performance while eliminating PCI overhead and maintaining hardware isolation. Although DPDK technology consumes additional CPU cycles, working together, Mellanox and F5 developed further solutions supporting optimized SR-IOV BIG-IP Poll Mode drivers that reduce the overhead associated with processing packets to significantly boost data plane performance.



Mellanox Unmatched DPDK Performance of 148 MPPS

Mellanox network adapters significantly improve the performance of F5 BIG-IP VNF Portfolio to near-line rate. Running cloud applications such as VNF's over DPDK, Mellanox ConnectX-5 Intelligent NICs offer the industry's highest bare metal packet rate of 148 million packets per second. For specific workloads, joint F5 and Mellanox customers leveraging Mellanox OvS offload (ASAP<sup>2</sup>) function in the ConnectX-5 NICs have seen up to 5X performance improvements with services like DNS. Beyond mature driver stability and performance optimization, Mellanox and F5 have been active leaders, driving further innovation in the DPDK software community.

## CONCLUSION

F5 VNFs running with Mellanox ConnectX family of network adapters with 10/25/50/100/200G Ethernet speeds together with purpose-built networking offload engines meet the extreme networking bandwidth requirements for 5G infrastructure upgrades and services. With the ultra-high performance, service providers working with F5 and Mellanox can quickly implement new 5G services while maximizing the ROI of their 5G network build-out.

### About F5

F5 Networks, Inc. is a global company that specializes in application services and application delivery networking (ADN). F5 technologies focus on the delivery, security, performance, and availability of web applications, as well as the availability of servers, cloud resources, data storage devices, and other networking components. Known originally for its load balancing product, today F5's product and services line has expanded into all things related to the delivery of applications, including local load balancing and acceleration, global (DNS based) load balancing and acceleration, security through web application firewall and application authentication and access products, DDoS defense. Discover more at [f5.com](https://f5.com).

### About Mellanox

Mellanox Technologies is a leading supplier of end-to-end InfiniBand and Ethernet interconnect solutions and services for servers and storage. Mellanox interconnect solutions increase data center efficiency by providing the highest throughput and lowest latency, delivering data faster to applications and unlocking system performance capability. Mellanox offers a choice of fast interconnect products: adapters, switches, software, cables and silicon that accelerate application runtime and maximize business results for a wide range of markets including high-performance computing, enterprise data centers, Web 2.0, cloud, storage and financial services.

To find out more, visit our website: [www.mellanox.com](https://www.mellanox.com)



350 Oakmead Parkway, Suite 100  
Sunnyvale, CA 94085  
Tel: 408-970-3400 • Fax: 408-970-3403  
[www.mellanox.com](https://www.mellanox.com)