# Mellanox-Linux Switch
## at the Service of Qrator Labs DDoS Attacks Mitigation

Since 2010, Qrator Labs has grown into one of the leading providers of Denial of Service (DDoS) attacks mitigation services and continuous network availability. Following massive customer growth and expansion, Qrator has found in Mellanox a high performance, extremely reliable switching architecture and critical component to underpin its innovative DDoS mitigation services.

### Background

Qrator Labs delivers protected, uninterrupted Internet and connectivity to enterprise customers in the financial services, media, gaming, government and other areas, as well as maintaining one of the largest BGP analytical platform. Qrator Labs is also an active participant in RIPE, IETF, NOGs, and other non-profit engineering communities.

Mitigating enormous and complex DDoS attacks requires significant uplink connection bandwidth and computing resources. Previously, Qrator's filtration node connected directly to the upstream internet service provider's equipment, comprising routers and switches with load balancing capabilities. Though this configuration was adequate to some degree, Qrator were not able to manage it themselves.

Over time and with exponential growth, Qrator required more direct control of the process in order to deliver quality of service, along with collecting key metrics that are necessary to  monitor and react as quickly as possible to attacks. After several years of testing various switch systems, Qrator found in Mellanox a reliable, efficient, scalable and cost-efficient switching architecture capable of delivering critical levels of reliability with extremely low latency.
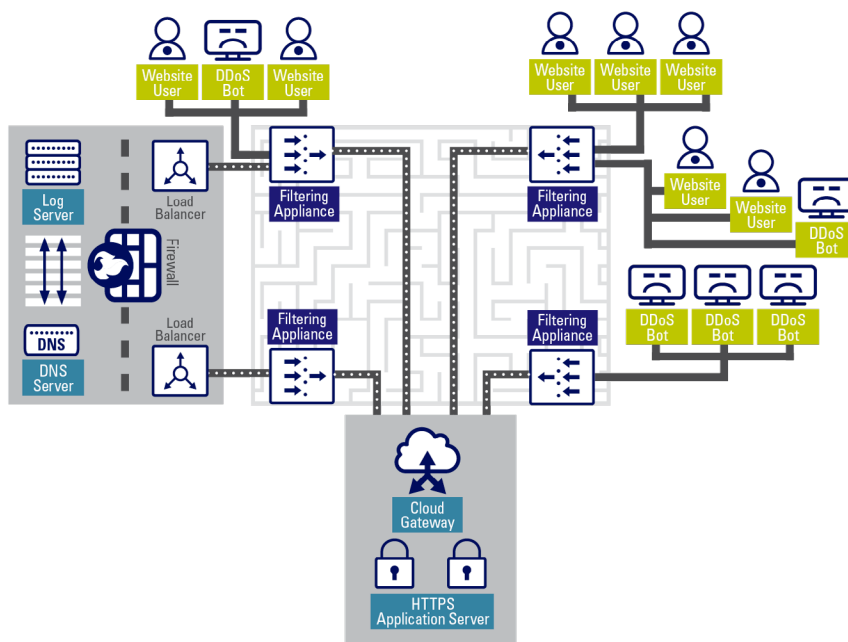


Figure 1:  Qrator Labs BGP-anycast filtering network employs the Mellanox switches to route traffic at each Point-of-Presence filtering appliance.

## Key Benefits

- Mainline in-kernel driver model for switch devices - any program that uses standard Linux networking API can run on the switch

- Open source solution streamlines process of adding to/modifying existing modules

- Operational Excellence and Network Visibility with Streaming Telemetry

- Realizing data center efficiencies and lower total cost of ownership (TCO)

- Highly responsive Technical Support

_" Linux switch enables Qrator to run open-source Linux over Mellanox's industry-leading Spectrum switch, and benefit from low power consumption, a rich feature-set, superior performance, and zero packet loss."_

Alexander Zubkov

Cloud Infrastructure Architect,

Qrator Labs

## Challenges

A major challenge for the ISP is to reach a pre-emptive, comprehensive DDoS protection with flexible, affordable pricing.

Mitigating enormous and complex DDoS attacks requires significant uplink connection bandwidth and computing resources.

However, whilst evaluating its options, Qrator identified that using ISPs equipment was very expensive.  Qrator thus decided to deploy its own load balancers at each PoP, with packet loss and cost-effectiveness being the key requirements.

Qrator sought to address a number of issues and criteria while seeking the right switch solution for DDoS mitigation: In addition to not dropping packets, a reliable DDoS mitigation solution must answer each packet. Since dropping packets during high packet-rate attacks may cause users to experience access problems, the DDoS would at least partially reach its goal. Thus Qrator continuously conducts switch tests and benchmarks to ensure reliable line-rate speeds.

## The Solution - Mellanox and Linux Switch

Mellanox switches work under a part of the open-source Linux Kernel mlxsw kernel driver, which turns switch ports into ordinary Linux interfaces. Being a part of the mainline Linux kernel, mlxsw driver is described as "an in-kernel driver model for switch devices which offload the forwarding data plane from the kernel."

This approach is very convenient for Qrator's developers who are used to working in the Linux environment and community, with  all the tools available under one API; this offers an extremely natural working environment for every modern programmer, developer, and network engineer. Any program that uses a standard Linux networking API can run on the switch. Moreover, all the network monitoring and control tools built for Linux servers, including homemade ones, are applicable.

**Zero packet loss:** Mellanox Spectrum-based switches passed Qrator's tough tests without any problems and without any packet loss (aligned with the information at zeropacketloss).

**Cost-effectiveness**: A major consideration was price - another sweet spot for Mellanox, which was found to provide a very cost-effective technical solution and support.

"Before moving to Mellanox," says Alexander Zubkov, Qrator Labs' Cloud Infrastructure Architect, "we had to manually patch the widely used Bird routing daemon on another vendor's switch. With the Linux Switch, implementing changes into the routing tables is just much more comfortable."

Furthermore, patches had  previously been tied to a proprietary API; this required Qrator's developers to update changes following a firmware upgrade in order to provide compatibility. However, with the Linux Switch, Bird is accessible "out of the box."

All Mellanox source code is open up to the level of the switch ASIC; this makes it possible to learn and perform modifications, right up until the specific point where one must know precisely how the ASIC, or at least the external interface, is built.
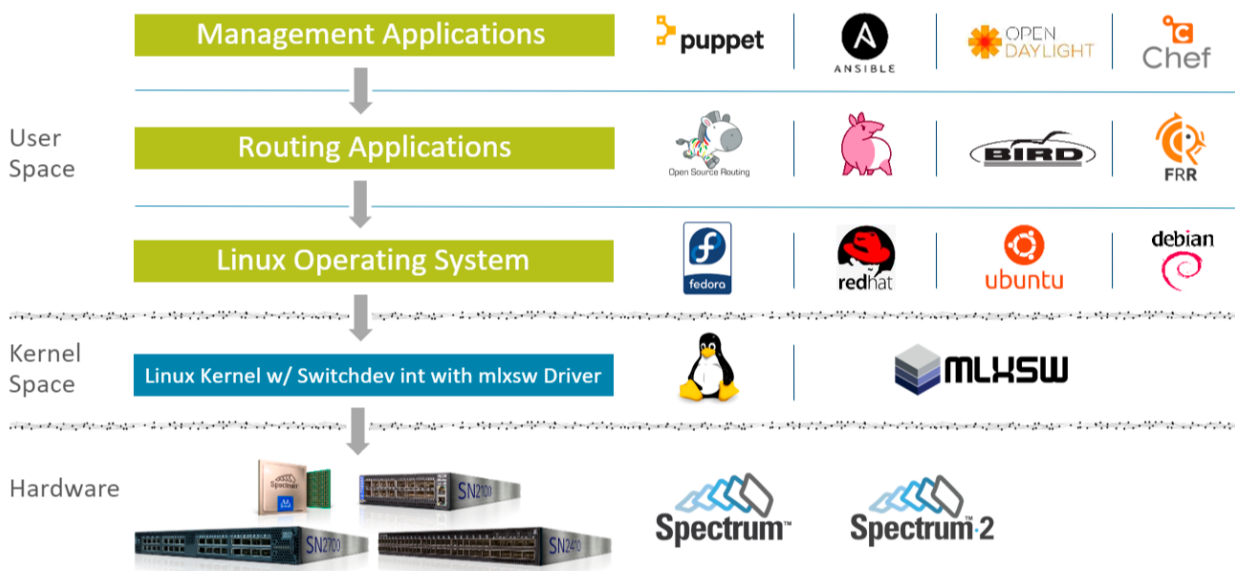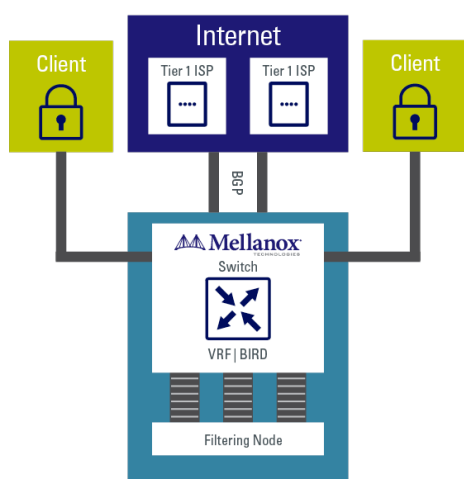


*Figure 2. Linux Switch Architecture*

## Results & Benefits

The combination of Spectrum switch under Linux Switch control best suited Qrator's needs, as the company provides full support for the already robust open source operating system out of the box.



*Figure 3. The Optimum Solution: Spectrum Switch under Linux Switch Control*

By standardizing on a Mellanox data center networking solution, Qrator is able to realize data center efficiencies and lower total cost of ownership (TCO) to meet the needs for rapidly expanding businesses.

Moreover, the extremely low power consumption of Mellanox Spectrum switches provides cost advantages to the Qrator solution. Even with the light footprint, these switches provide the rich feature set and superior performance with the industry-leading Spectrum ASIC.

In addition, through predictable performance and network visibility, Qrator is able to realize a superior customer experience in delivering business critical networking to their clients.

### About Qrator Labs

Since 2010 Qrator Labs has been operating a globally distributed DDoS attacks mitigation and continuous availability network. In order to serve uninterrupted Internet connectivity to enterprise customers, Qrator Labs maintains one of the world's biggest BGP analytics platforms - Qrator Radar. Based on the data feeds Radar processes, Qrator is involved in discussing and upgrading network technologies via participation in RIPE, IETF, NOGs, and other non-profit engineering communities. More information is available at www.qrator.net

### About Mellanox

Mellanox Technologies (NASDAQ: MLNX) is a leading supplier of end-to-end Ethernet and InfiniBand intelligent interconnect solutions and services for servers, storage, and hyper-converged infrastructure. Mellanox intelligent interconnect solutions increase data center efficiency by providing the highest throughput and lowest latency, delivering data faster to applications and unlocking system performance. Mellanox offers a choice of high performance solutions: network and multi-core processors, network adapters, switches, cables, software 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, network security, telecom and financial services. More information is available at www.mellanox.com.

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