Software Defined NIC Fabrics

For high-performance and efficient Qualcomm Centriq™ 2400 Server Processor Arm-based data centers

Solarflare is the market share leader in connecting servers for electronic trading to ultra-low latency Ethernet networks. The company is building on that technology to pioneer neural-class networks for modern data centers being overhauled with a broad range of new technologies including servers with high-density Arm-based CPUs.
Higher core density and lower power

Driven by the needs of global cloud applications, the data center industry is undergoing an epic migration to a scale-out architecture with computing distributed among dozens to thousands of cores. As a result, data center operators need server processors with higher core densities and lower power to efficiently support these sprawling environments. Qualcomm answers the call with Centriq 2400 server processor, an Arm-based processor with up to 48 cores, and the world’s first 10-nanometer server processor. A single data center rack equipped with 38 servers—each with a pair of Centriq Arm processors—delivers 3,648 cores to achieve the neural-class core density needed by cloud applications such as web hosting and big data analytics, to name just a few.

Connected with neural-class networks

A single Falkor™ core from the Qualcomm Centriq 2400 server processor is designed to host multiple virtual machines and containers. That means a single rack with over 3,000 cores can easily require interconnections for over 10,000 applications—the same number of connections maintained by a human neuron. Add the fact that 90% of data center traffic is within the data center and the result is a requirement for neural-class server networking supporting ultra-scale connectivity to thousands of other VMs or containers, ultra-low latency performance to allow scaling VMs without system jitter, micro segmented security for every VM or container, and telemetry down to the network packet level for troubleshooting and traffic engineering.
Efficient Networking with Solarflare XtremeScale

A standard NIC with packet processing and 1,000s of vNICs

XtremeScale software-defined NICs from Solarflare represent a new class of general purpose NICs with the FPGA-like ability to perform packet inspection, and then offer APIs to a growing list of analytics, network performance management and security applications which need the valuable packet data. The latest generation of Solarflare NICs supports 2,048 virtual connections—making XtremeScale NICs are the first to break the ultra-scale connectivity barrier of over 1,000 virtual connections.

Micro segmented fabric services scale-out alongside Centriq servers

For network traffic engineers designing data centers with the highest levels of automation and efficiency, valuable XtremePacket telemetry data and Solarflare APIs are used to cost-effectively instrument Arm servers, and then to shape traffic with micro segmented network service chains. The capabilities of the XtremePacket Engine are also leveraged by IT organizations who deploy shrink-wrapped Solarflare NIC fabric services to achieve higher data center efficiency. Solarflare offers three types of fabric services for Arm servers that scale with each Arm-based server, VM and container.

Telemetry—Solarflare NICs provide 100% packet inspection at line-speed, APIs for traffic engineering, and a software stack needed to configure are available for Arm-based packet capture and analytics servers.

Security—Every Solarflare NIC includes ServerLock technology for deploying Arm server packet surveillance, or a full-featured hardware based firewall including white listing and black listing of traffic to the server.

Acceleration—Kernel bypass allows traffic to Arm-based servers to bypass the Linux kernel and eliminate vSwitch overhead, buffer copying, and Linux context switching. Universal Kernel Bypass (UKB) is the Solarflare suite of applications which lowers latency and allows VM and container density to scale with far less performance degradation.

Putting it all together for NGINX

NGINX is the world’s most popular open source application delivery platform for high traffic sites, powering over 300 million properties. Test results show that Centriq Arm servers running the Solarflare Onload® kernel bypass fabric service, deliver 60% higher NGINX connection rates, 35% more container throughput, 50% lower latency—all while eliminating system jitter.

Centriq Server Performance with Solarflare XtremeScale NICs
# Solarflare Software Defined NICs and NIC Fabric Services for Qualcomm Centriq Arm Servers

## Software Defined NICs

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFN8522</td>
<td>10GbE, Dual Port, PCIe 3.1, Low Profile, SFP+</td>
</tr>
<tr>
<td>SFN8542</td>
<td>40GbE, Dual Port, PCIe 3.1, Low Profile, QSFP+</td>
</tr>
<tr>
<td>SFN8722</td>
<td>10GbE, Dual Port, OCP Mezzanine Card.</td>
</tr>
<tr>
<td>SFA9000</td>
<td>25GbE Dual Port, PCIe 3.1, Low Profile, SFP28</td>
</tr>
</tbody>
</table>

## NIC Fabric Services

### Storage (SolarStorage)
- NVMe over TCP: POSIX-compliant TCP stack with support for an NVMe over TCP fabric.

### Acceleration (Universal Kernel Bypass Suite)
- ScaleOut Onload: TCP kernel bypass without modifying apps. Lowers latency to 2-3 μsec.
- Onload: Fastest kernel bypass without modifying apps. Supports TCP and UDP packets. Provides ~1μsec latency.
- TCPDirect: Fastest kernel bypass period. Uses Solarflare BSD-like API library for TCP and UDP packets. Result is <1μsec latency.

### Security (SolarSecure)
- SolarSecure ServerLock: Provides micro segmented packet surveillance, finger printing, filtering and firewalls for scale-out, tamper proof security inside the data center.
- SolarSecure Manager: Console for managing ServerLock configurations and policies on multiple servers.

### Telemetry (SolarCapture)
- SolarCapture Investigator: Select, view and extract packets of interest by running query sessions defined by setting-up time ranges, outputs, filters.
- SolarCapture Dashboard: Console for managing multiple SolarCapture appliances and systems.