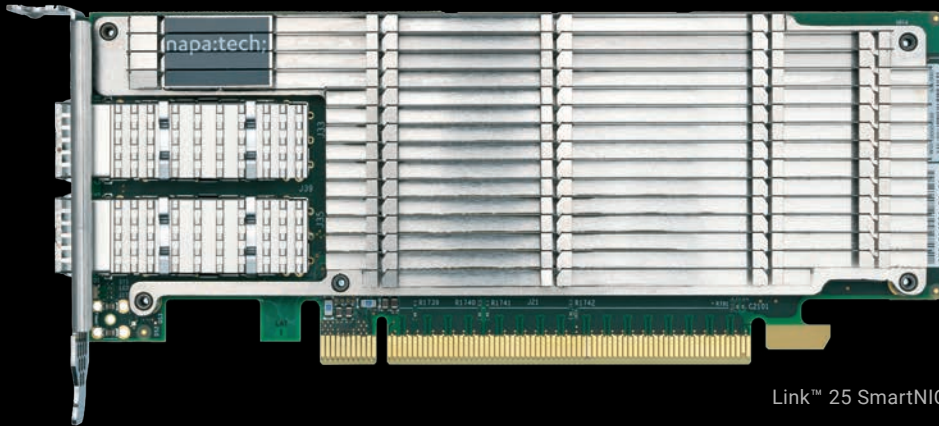# napa:tech;

RECONFIGURABLE COMPUTING

PRODUCT BRIEF

Link™ Virtualization Software
for Napatech FPGA-based SmartNICs

Link™ 25 SmartNIC

The Rise of Network Virtualization

Network designers and operators of all types are turning to virtualized solutions as key components in their next network architecture designs for many reasons. Virtualization of physical resources offers the ability to deploy applications and services as software on open and standard computing platforms, which promises to save time and money by optimizing equipment costs and operational expenses. For cloud data center operators, service providers, and enterprises, virtualization can maximize server utilization, speed up time to application delivery, permit rapid change, offer scalability, and offer agile deployment and seamless live migration of resources. Virtualized solutions also offer the ability to provide network slicing and overlays for application, service, or client separation.

Network Virtualization Challenges

With the incredible growing volume and complexity of network traffic, IT infrastructures are pressed to their utmost limit to support the necessary networking performance and needed security posture that customers demand. Operators designing, supporting, and hosting virtual data center applications are challenged to do so affordably, while maintaining as much compute resource in the smallest form factor as possible.

Network architects must strive to extract the maximum output per application or virtual machine (VM) with the lowest networking costs defined by packet processing per CPU, per watt, and per dollar, which are all critical to the success of a scalable data center to lower total cost of ownership.

Increasingly, dedicated network appliances are being replaced by solutions based on general-purpose computing architectures that keep cost low via the use of standard, off-the-shelf x86-based server platforms. Napatech supports this COTS vision by offering flexible data plane processing options for application acceleration via reconfigurable SmartNICs for dedicated offloads.

The Napatech solution offers accelerated 200 Gbps networking throughput for varied software-defined data planes, combining the flexibility of x86 general-purpose processors and FPGA SmartNICs in an architecture supporting the COTS hardware vision.

Open vSwitch Acceleration

For virtualized application hosting, Open vSwitch (OVS) is the default data plane solution that users leverage for demultiplexing traffic from the network into, out of, and between virtualized applications, networking functions (VNFs) running in VMs or containers. Software-only implementations of OVS, though, fail to meet the performance and scale of virtualized applications without significant CPU utilization.
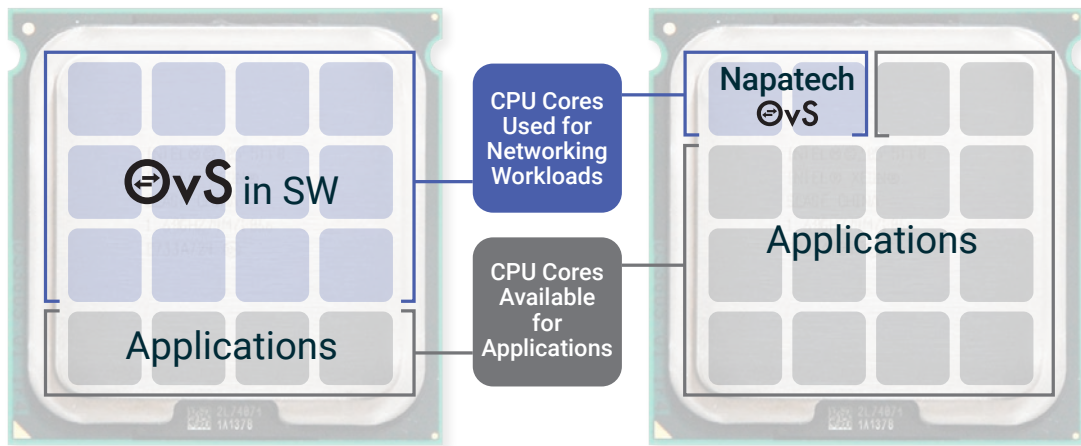
Software OVS with Basic NIC

Full OVS offload with SmartNIC
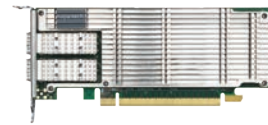
Running OVS in software, which is the standard practice, extracts significant CPU resources from revenue generating applications simply for directing traffic into and out of VMs or containers. This results in less performance per server, and the need to add more servers to achieve the required performance.

Virtualization Acceleration

Napatech provides a hardware-based virtualization solution for OVS offload, offering a 60x performance gain compared to OVS kernel and 6x gain compared to OVS DPDK, while reducing CPU consumption by as much as 90% compared to alternatives. While kernel-based or user space (DPDK) versions of OVS are costly from a CPU utilization perspective, with network intensive workloads, Napatech SmartNICs and Link™ Virtualization Software accelerate OVS and provide much better CPU efficiency, lower complexity, enhanced scalability and increased network performance.

The Napatech offload solution for OVS DPDK is open and upstreamed. It not only meets the performance goals for carriers, enterprises, and data center operators, but does so at the price goals that the ideas of NFV promise. The solution is also designed as a baseline offering for adjacent requirements, optimized for specific deployments that customers may need for their environments.

Key Benefits

- **Network Performance**: More than 60X gain compared to basic NICs with line-rate forwarding up to 200Gbps and 60 million packets per second.
- **Server Scalability:** More than 90% reduction in server utilization, removing burdensome network and security processing from valuable and expensive CPU cores
- **Feature Velocity:** Reconfigurable and programmable

processing to retain hardware performance and the speed of software innovation,
- **Data Center Sustainability:** 5X lifetime cost savings by requiring fewer servers, rack space, power and cooling
- **Rich Functionality:** Supported on a family of FPGA-based SmartNICs that include 10, 25, 40 and 100 gigabit Ethernet.

Features

- Basic NIC support (ethtool/ifconfig)
- Full offload of OVS DPDK datapath
- OVS version 2.11
- DPDK v.18.11 (LTS)
- Fastpath forwarding of traffic between specified vSwitch vPorts
- OVSDB, CLI, or local flow API for configuration
- Support for standard SDN controllers
- OVS stateful statistics
- Offload of 1K megaflows (wildcarded flows)
- Support for millions of flows into the megaflow structure
- Extensive and configurable match processing for L2, L3, L4 packet headers
- VLAN/VXLAN, Q in Q encapsulation/decapsulation
- Hash-based load balancing
- Link aggregation (active/active, active/standby)
- Traffic port mirroring
- Scalable from 63 to 256 Virtual Machines / Virtual Functions
- Virtio support
- VM live migration
- Jumbo frame support
- Supported on standard Linux distributions (Cento, Ubuntu)
- 10, 25, 40 GbE network interfaces on NT50B01, NT200A02
- Quality of Service (QoS)

NAPATECH RECONFIGURABLE COMPUTING