ACE-NIC50/ACE-NIC50sec

Carrier-Grade SmartNIC for VNF and IPSec Acceleration

Ethernity's ACE-NIC50 SmartNIC with 10/25 Gigabit Ethernet connectivity, built using the FPGA-based carrier-grade ENET Flow Processor technology, provides best-in-class performance and an extensive feature set for Telco and enterprise NFV networks. Cloud and MEC infrastructure requires that equipment be optimized for carrier-level quality of experience, performance, and power at scale. The ACE-NIC50 can achieve these goals by moving specific workloads onto a low-power, highly optimized adapter equipped with an FPGA-based flow processor, leaving the host server to run more standard compute functions. By offloading QoS, Policer, OAM, overlay, and many other functions, including security, CSPs can dramatically reduce operating and capital expenses, and provide a new spin for mass deployment of virtual solutions.
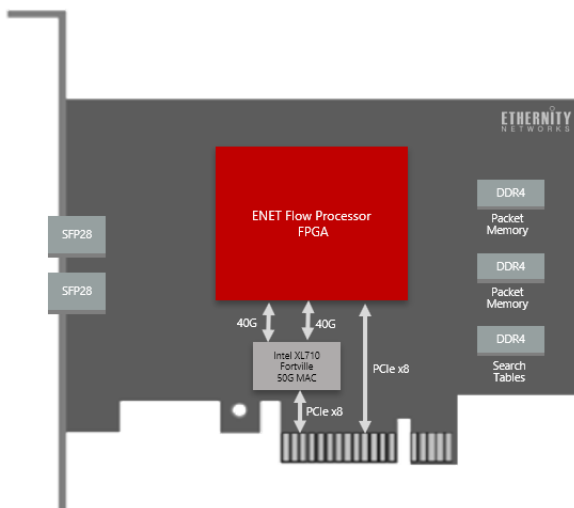
Product Highlights

- Ideal for Telco cloud solutions and performance hungry applications – 10/25G connectivity

- DPDK accelerating workloads

- IPSec tunnel offload integrated with open source software

- Multi-tenant environment to maximize VNF density

- Low latency forwarding

- Different overlay technologies supported

The ACE-NIC50 provides flexible network interface capabilities, advanced network and security hardware accelerators, and comes with integrated DPDK hardware offload package or with a comprehensive software network protocol suite, all of which are easily deployed in both Telco and enterprise customer environments. The growing demand for security in the cloud and at the network edge requires both crypto and filters to be integrated for various types of data. The ACE-NIC50sec delivers security acceleration with IPSec tunnel offload that works together with additional overlay methods, such as VxLAN and NVGRE inline processing, freeing the CPU from intense security processing and thereby improving TCO.

Figure 1: ACE-NIC50 with optional Intel XL710 controller

Product Features

10/25G SmartNIC

Ethernity's ACE-NIC50 offers flexible 10/25G Ethernet connectivity and the programmable FPGA-based ENET Flow Processor in a single standard adapter card, providing NFV and security acceleration for CSPs, enterprise data centers, and standalone solutions. The ACE-NIC50 provides flexible IO capabilities with hardware acceleration to optimize virtual infrastructure for performance, scalability, power, and cost, while offloading VNF, security, and overlay networks to reduce OPEX and CAPEX.

Accelerating NFV Workloads

Network functions have traditionally been handled by dedicated hardware, such as routers, load balancers, and firewalls. Network Function Virtualization has decoupled such services from the hardware, but at the expense of CPU efficiency. The ACE-NIC50 uses FPGA programmability to handle NFV on multi-purpose smart hardware that accelerates performance, improves agility, and reduces expenses.

Quality of Service

The ACE-NIC50 manages, prioritizes, and steers traffic flow based on hierarchical Quality of Service (QoS) levels and supports dedicated queues in hardware to shape and schedule traffic based on priority.

DPDK Acceleration

In most Carrier cloud infrastructures, packet switching is handled on top of DPDK. This requires dedicated CPU cores to manage the flow, increasing CPU usage and reducing scalability. The ACE-NIC50 uses standard DPDK rte_flow APIs to interface with VNFs and offload the forwarding functions onto the NIC, reducing CPU overhead and enabling carrier-grade QoE for virtual functions, providing performance improvements and scalability for network virtualization. A comprehensive list of high-end HW acceleration functions is provided in the DPDK package. The functionality includes H-QoS, filters, policer, IPSec, and many other functions to be offloaded.

Security Offload

Ethernity's leading technology delivers security acceleration through IPSec offload with and without tunneling, to reduce CPU overhead. Traditional offloads, such as checksum, are maintained, while implementing end-to-end encryption for security in virtualized environments. The ACE-NIC50 also can handle customized offload functionalities through full programmability of the FPGA hardware.

Overlay Network Offload

The ACE-NIC50 offloads encapsulation/decapsulation of overlay network traffic (VxLAN, NVGRE, etc.) to the adapter to efficiently manage VM traffic, ensure VM isolation in shared network infrastructure, and reduce overhead on the CPU.

Specifications

SFP+/SFP28 Connectors
- Optical approved transceivers
  - Finisar FTLX8574D3BCV (10G)
  - Intel LTF8505-BC-IN E25GSFP28SR (25G)
- Direct Attached Twinax Copper (DAC) approved cables
  - FS SFP-10G-DAC IN 10G SFP+ DAC 3m (10G)
  - FS S28-PC01 25G SFP28 DAC 1m (25G)

Interfaces
- PCIe Gen3 x16 (x8 + x8 bifurcation) or x8
- 1 PPS for precision time stamping
- DPDK
- SR-IOV
  - 8 PFs (physical functions)
  - 128 VFs (virtual functions)

Ethernet
- Jumbo frame support
- IP packet fragmentation
- RMON, sFlow

Stateless offloads
- TSO / LSO
- Enhanced RSS

Network Functions offloads
- L2/L3 Forwarding, NAT/NAPT
- Segment Routing with MPLS label editing
- VxLAN, NVGRE
- GTP for Mobile backhaul solutions
- L2TP, PPPoE tunnels
- PTP (IEEE 1588) (one-step or two-step)

ACE-NIC50sec security offloads
- IPSec tunneling with/without overlay:

Encryption:	Authentication:
3DES CBC	MD5
AES CBC 128/192/256	SHA1 / SHA256 / SHA384 / SHA512
AES CTR 128/192/256	
AES CCM 128	AES XCBC
AES GCM 128/192/256 (†)	AES CMAC
(†) GCM up to 40Gbps	AES GMAC 128/192/256

- Firewall and DDoS mitigation engine

Compliance
- IEEE Std 802.3ae 10G Ethernet
- IEEE 802.3ad Link Aggregation & Failover
- IEEE 802.1Q.1p VLAN Tags & Priority
- MEF10 (10.3) compliance
- IETF unicast and multicast routing

MEF, BBF and Carrier Ethernet
- TR-101, TR-156, TR-301, TR-167
- MEF Policer 2r3c and WRED
- H-QoS supporting WFQ and SP
- OAM and BFD, with 3.3ms CFM
- Performance monitoring and data capture engine
- High precision packet stamping

SW KIT
- ENET Driver, HAL coming with ENET CLI with Application Guide
- ENET DPDK (eDPDK) component
- Full Router-Switch network protocol suite

Customization
- Can be customized with additional functions required by VNF or NFVi

Physical Specifications

Standard Interface	PCI-Express Base Specification Revision x8
Board Size	Standard height, half length: 167.65 x 111.20mm (6.7" x 4.376")

Minimum Server Requirements

CPU	At least 2.0-2.5 GHz @ 1CPU @ 8 cores
PCIe	Gen3 x8 + x8 bifurcation or x8
OS	At least CentOS 7.5 / Ubuntu 14.04

Ordering Options

Product Name	Product Number	Product Description*
ACE-NIC50	ENA2050F	2 x 25G SmartNIC with PCIe Gen3 x8 + x8, FH/HL
ACE-NIC50sec	ENA2050FS	2 x 25G SmartNIC with PCIe Gen3 x8 + x8, 40G IPSec, FH/HL

*Additional options with different port densities are available upon request