

## ACE-NIC20

### Edge-Optimized FPGA SmartNIC

Ethernity's ACE-NIC20 FPGA SmartNIC is a compact half-height/half-length all-programmable SmartNIC, supporting advanced networking and security data path offload for Carrier Ethernet switch/router, hierarchical QoS and IPsec, with total of 20Gbps performance.

The ACE-NIC20 is ideal for telco/cloud edge deployments thanks to its small size and its especially low server CPU utilization. By fully offloading the networking and security data path to the FPGA, the ACE-NIC20 only communicates control packets to and from the server host CPU via its PCIe connector. This enables various control stack applications to run over x86 to configure the ACE-NIC20's data path for high-throughput SD-WAN, IPsec VPN gateway, routers, BNG, EPC, and many other applications. The ACE-NIC20 also comes with DPDK APIs to serve as an NFVI gateway and to provide VNF data plane acceleration in virtualized environments.

### Product Highlights

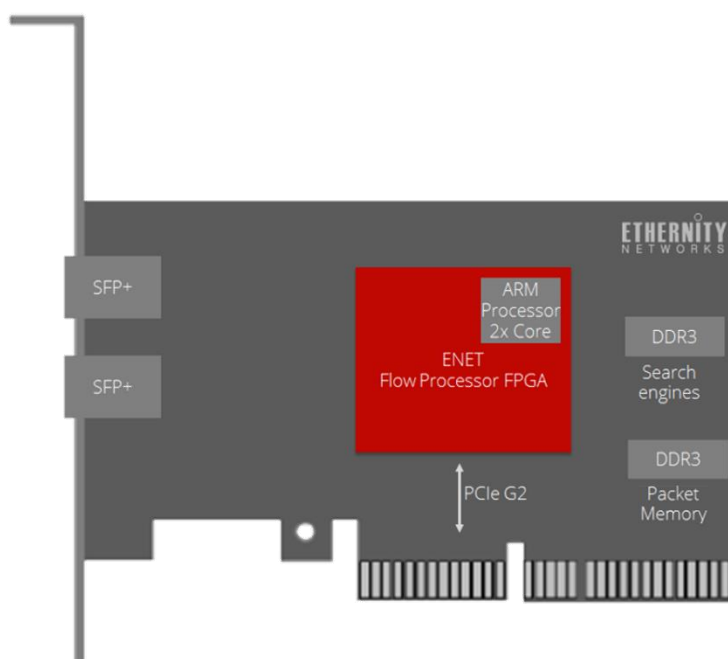
- Unique – the only 20G FPGA SmartNIC on the market for edge applications
- Advanced Carrier Ethernet switch-routing performance
- Exceedingly low server CPU utilization thanks to networking and security data path offload onto FPGA
- Built-in dual-core ARM processor to enable user applications to run onboard
- Supports IEEE 1588 PTP for meeting 4G and 5G synchronization requirements
- Compact form-factor
- Very low-power (less than 15W)
- Highly customizable to virtually any protocol or interface configuration
- Competitively priced

The ACE-NIC20's FPGA SoC comes equipped with Ethernity's powerful ENET Flow Processor with its feature-rich networking platform, including a Carrier Ethernet switch/router, traffic management, and IPSec data path.

The ACE-NIC20 also incorporates Ethernity's comprehensive networking software suite, which offers a complete L2/L3 control stack. A wide variety of applications can therefore benefit from the ACE-NIC20's inline data forwarding.

The ACE-NIC20 also offers the option of handling control functions in the embedded dual-core ARM processor in conjunction with other application running on the x86 CPU, to create a self-contained fully functioning switch-router, with no required input from the server CPU.

An alternate version of the ACE-NIC20 is available with I/O controller and support for SR-IOV and DPDK.



*Figure 1: ACE-NIC20 Edge-Optimized HHHL SmartNIC*

## ACE-NIC20 Applications

### Flexible 20G SmartNIC

Ethernity's ACE-NIC20 offers two 10G ports for user and network connectivity and the programmable FPGA-based ENET Flow Processor in a single standard adapter card, providing inline data forwarding, with only control plane protocols accessing the CPU. On top of the standard offering, the ACE-NIC20 includes a connector with two SerDes for adding interfaces, allowing the ACE-NIC20 to be customized to support any customer networking and security needs.

### Ideal for Multi-access Edge Compute (MEC) Deployments

The ACE-NIC20 takes up very little space with its half-height, half-length form factor, and it uses less than 15W of power, making it ideal for network edge deployments. It also adds virtually no load onto the server CPU thanks to its full data path offload to FPGA, freeing the CPU from data plane tasks so that it is available to handle other compute and virtual network function applications.

### Network Appliances on COTS

By combining the data forwarding capabilities of Ethernity's FPGA-based ENET Flow Processor, the embedded ARM processor, and Ethernity's comprehensive control plane software, the ACE-NIC20 is ideal for use in low-cost commercial off-the-shelf (COTS) servers. OEMs can simply plug the ACE-NIC20 into a COTS server to create a variety of standalone network appliances, including security gateway, cell site router, IoT aggregation, vEPC, and vBNG, reducing time-to-market by eliminating the need to design hardware and software from scratch.

## Specifications

### Connectors

- SFP+

### Interfaces

- PCIe Gen2 x4
- 1 PPS for precision time stamping

### Ethernet

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

### Network Functions Offloads

- L2/L3 Forwarding, NAT/NAPT
- Segment Routing with MPLS label editing
- VxLAN, NVGRE
- GTP for Mobile backhaul solutions
- L2TP and L2TPv3, PPPoE tunnels
- PTP (IEEE 1588) (one-step or two-step)

### ACE-NIC20sec Security Offloads

- IPsec tunneling with/without overlay:
 

<u>Encryption:</u>	<u>Authentication:</u>
3DES CBC	MD5
AES CBC 128/192/256	SHA1 / SHA256 / SHA384 /
AES CTR 128/192/256	SHA512
AES CCM 128	AES XCBC
AES GCM 128/192/256 (t)	AES CMAC
(t) GCM up to 40Gbps	AES GMAC 128/192/256
- Firewall and DDoS mitigation engine

### Compliance

- IEEE Std 802.3 clause 49, base KR, 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 with ENET CLI with Application Guide
- Full switch/router network protocol suite including MSTP, BGP, RIP, OSPF, SNMP, and traffic management

### Customization

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

Physical Specifications	
Standard Interface	PCI-Express Base Specification 2.0 x4
Board Size	Compact half height, half length (HHHL)
Minimum Server Requirements	
CPU	x86. Other CPU options available upon request
PCIe	Gen 2 x4
OS	Ubuntu and CentOS. Other OS support available upon request

### ACE-NIC20 Ordering Options

Product Name	Product Number	Product Description*
ACE-NIC20	ENA2020	2 x 10G FPGA SmartNIC with PCIe Gen2 x4, HH/HL, Dual-core ARM
	ENA2020Z (roadmap)	2 x 10G FPGA SmartNIC with PCIe Gen2 x4, HH/HL, Dual-core ARM, Ethernity I/O Controller for SR-IOV and DPDK support
ACE-NIC20sec	ENA2020Z-Sec	2 x 10G FPGA SmartNIC with PCIe Gen2 x4, HH/HL, Dual-core ARM, IPsec

\*Additional configuration options with different port densities and protocols are available upon request.