ENET EPC/vEPC Solution

Ethernity Networks' ENET Evolved Packet Core (EPC) solution provides a high-performance data plane for current 3G/4G and next generation 5G networks. Ethernity delivers a 5G Quality of Experience (QoE) that includes high bandwidth, low latency, dense connectivity, and multitenancy. Moreover, the solution produces exceptional performance in a fully programmable data plane, enabling fast adjustment to various Telco architectures.

ENET EPC solution is an easily programmable data path that adapts to a service provider's unique requirements and evolves with the ever-changing architectural requirements of the mobile market. The solution's unique combination of performance and flexibility is enabled by Ethernity's patented ENET Flow Processor technology, which extracts exceptional performance from merchant FPGA silicon at a price point competitive with proprietary network processor ASSPs.

ENET EPC solution can support both L2, L3, and MPLS networks together with secure VPNs, plus it can be easily integrated with both traditional control plane and virtual network functions (VNF), an important feature for 5G business models. The ENET EPC data path also provides built-in network slicing with extensive multi-tenant control and with service partitioning and isolation features.

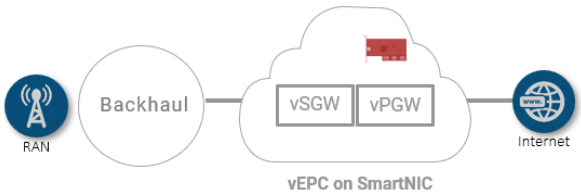
The low latency data plane provided by the ENET technology enables profit-generating backhaul services. Above and beyond its technical advantages, Ethernity's cost-efficiency guarantees drastic reductions in both CAPEX and OPEX.

Solution Integration Options

- FPGA SoC
- SmartNIC

Solution Highlights

- 1/10/25/40/100GbE ports
- Offloading entire IPCS and ETHCS (VPLS/VPWS) data path GW onto FPGA
- P-GW/S-GW for 16K UEs, 128K TFTs, and 8 APNs
- Management and control packet identification: NCS (MNG), AAA, SCTP, ARP, GTP-U, DHCP (native, relay)
- QoS per UE/TFT, based on L3/L4 fields
- In-flow processing billing counters per TFT
- Handover redirect in HW
- Hotlining redirect in HW
- Local switching
- Packet duplication for IPTV - IGMP snooping
- IP fragmentation



The solution can be ordered as an FPGA Flow Processor SoC for standard devices, or the same functionality can be purchased as a SmartNIC solution for accelerating VNFs or network function virtualization infrastructure (NFVI) based on DPDK.

Built-in Backhaul Overlay Offload

The in-flow data path processing in Ethernity's EPC solution provides various mechanisms traditionally used by mobile operators and offers numerous options for connectivity to satisfy an operator's specific network application scenarios. The Ethernity switch-router solution includes GTP encapsulation with GRE or VxLAN, and by combining standard GTP with IPSec tunneling, operators can securely support Next Generation networks.

Improves Resource Utilization

By partially or fully offloading resource-consuming virtual functions to the FPGA, ENET technology eliminates the heavy load on the CPU. This hardware acceleration means that under similar conditions there are many more available user sessions in the forwarding pool with deterministic results both for high throughput and low latency.

Enables Flexible Flow Management and Simplifies Orchestration

The ENET Flow Processor, whether in a SoC or SmartNIC solution, provides all aspects of fault, configuration, accounting, performance, and security information to the control stack using various APIs, including DPDK and CLI. Furthermore, the Ethernity ACE-NIC SmartNIC offers a version equipped with an Intel XL710 controller that enables easy integration into any Open environment with DPDK and SR-IOV.

Precise Network Measurement Techniques

Management functions are streamlined through massive Prob analyses for both L2 and L3, including delay and loss measurement with 3.3us CCM. Additional functions, such as BFD, are easily programmed into the FPGA to ensure SLA for thousands of simultaneous customers, and elements like RFC2544, and TWAMP can be added to embedded engines upon request for network testing.

Multiple Deployment Options

A programmable FPGA data plane decouples network functions from the hardware to provide a service-based, modular design that includes control plane and user plane separation and promises deterministic performance at the point of QoE. This approach allows both standard EPC development and new software deployments that are aligned with Carrier business models.

Traffic Flow Management

The Ethernity data path manages the following types of traffic flows:

- PDN to eNB (segment switch) to support user plane (major data path) and possibility to send ARP from PDN to multiple eNB within VPLS service
- eNB to eNB (local switching): X2 Intra-EPC handover for both data and control, meaning UE shortcut
- EPC (App) to eNB for control path
- MNG to EPC/eNB for out-of-band messaging

Features

Interface
- Thousands of v-Interfaces to enable per UE management
- Jumbo Frames (>9600 bytes)
- Broadcast Storm Protection
- FC and PFC
- RMON

Ethernet/Carrier Ethernet
- 802.3 and TR101 Bridge
- Hardware MAC Learning
- 802.1Q VLANs and 802.1ad QinQ
- 802.3ad LAG
- Provider Bridging
- Ring & Path Protection
- MEF CE 1.0/2.0 Compliant
  MEF 9,10 & 14
- E-Line, E-LAN, E-Tree, E-Access

IP Routing/Gateway
- IPv4 / IPv6 Routing/Forwarding
- Virtual Routers
- Policy-Based Forwarding
- VRRPv2/v3
- FRR

Multicast Routing
- IPv4/IPv6 Multicast
- IGMP v1/v2/v3
- MLDv2

MPLS
- MPLS LER
- MPLS LSR

Tunneling and VPN
- 3GPPP tunnels with or without GRE or VxLAN
- PPPoE/L2TP
- VPLS/H-VPLS (E-LAN)

Quality of Service (QoS)
- Deep Packet Buffering
- Hierarchical Queuing/Shaping
- Strict Priority Queuing
- Weighted Fair Queuing (WFQ)
- WRED
- Policing 2r3c
- 802.1p
- DiffServ
- MPLS EXP Bits

OAM and Monitoring
- IEEE 802.1ag Connectivity Fault Management
- ITU-T Y.1731 (DM, SLM, and Throughput)
- IPv4/IPv6 BFD
- Ingress Port/Flow Mirroring
- Egress Port/Flow Mirroring
- sFlow statistics and data tapping

Security
- Multi tuple ACL support
- In-line IPSec crypto
- AES-128/256, GCM, CBC, SHA-256
- DDoS attack mechanism

SDK Control Interfaces
- ENET HAL
- CLI script API

Solution Options

SmartNIC	4 x 10SFP+ interfaces / 40Gbps 2 x 25SFP28 / 50Gbps 2 x QSFP interfaces / 80Gbps
FPGA ENET Flow Processor SoC	4 x 10G interfaces 2 x 25G + 8 x 10G interfaces