

## 5G UPF Solution

Following the industry trend toward network disaggregation, service providers are seeking to enhance their 5G networks with open User Plane Functionality (UPF) and by moving their UPF closer to the network edge. To achieve this, they require a means of offloading the UPF data plane in a way that is suitable for use at the edge without compromising on performance.

Our joint, open, virtualized solution is a unique combination of Ethernity's ACE-NIC100 FPGA SmartNIC and TietoEVRY's UPF software development kit (SDK). Ethernity's ACE-NIC100 has a small footprint and low power dissipation, critical at the network edge. TietoEVRY's SDK is fully containerized and makes use of Traveling's open-source VPP data plane software and DPDK APIs. This allows service providers to boost performance, reduce networking overhead, and lower their total cost of ownership, as well as collocate the UPF with other services.

Complete offload of the UPF forwarding data path is handled via standard DPDK APIs, assuring carrier-grade UPF performance to meet the strict 5G latency requirements at an extremely competitive price. The FPGA platform is far better suited for packet processing than CPUs, and it offloads the compute-intensive data plane and avoids burning CPU cores, which leads to costs savings and far better scalability.

### Solution Highlights

- Meets 5G latency requirements by offloading forwarding to the FPGA
- 1:20 saving on CPU cores allows the use of lower cost server or boosts capacity on single server
- Low-cost, integrated UPF with hardware acceleration
  - Reduced TTM
  - Up to 200 Gbps UPF traffic offload
  - Runs on virtual machines and Docker containers
- Optimization to the customer's unique UPF ecosystem
  - Maintenance and development license option

### Key Features

- Up to 200 Gbps UPF forwarding
  - 3µs latency
  - 10/25/40/100GbE interfaces
- Containerized, cloud-native
- Open-source ecosystem
  - VPP data plane, Traveling
- SMF/UPF PFCP management (N4)
- IP forwarding and routing (N6)
- GTP/GTPU tunneling (N3, N9)
  - IPSec/GRE options
- QoS and policing
- Flow classification
- Billing, monitoring, and filtering
- Packet inspection
- DPI offload

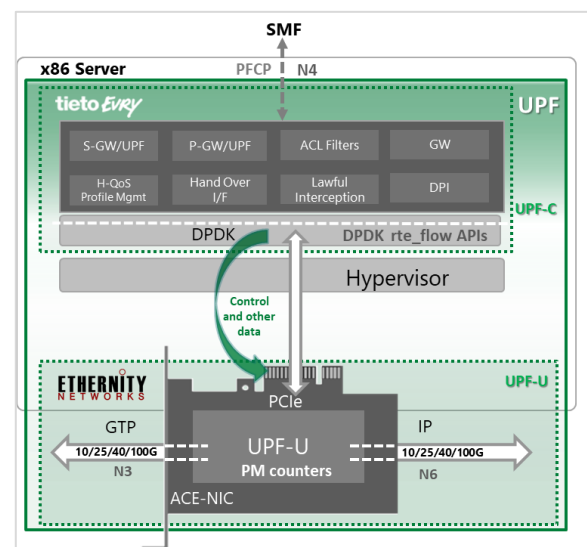
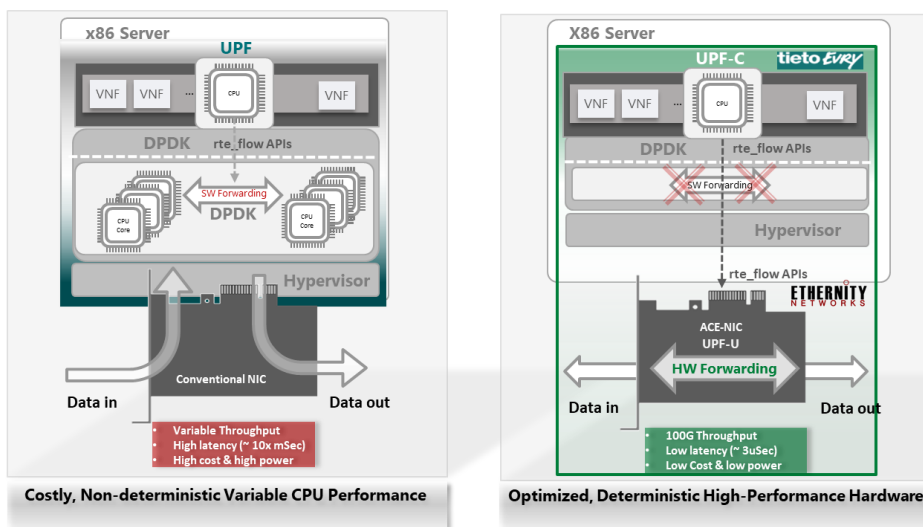


Figure 1: TietoEVRY-Ethernity combined UPF solution

## Solution Features

The 5G UPF solution assures deterministic performance with high throughput and improved latency. Our solution supports 5G Quality of Experience (QoE) requirements, including high bandwidth, low latency, dense connectivity, and multitenancy.

It enables 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.



This 5G UPF solution releases CPU cores, extracting exceptional performance from merchant FPGA silicon at a price point competitive with proprietary ASIC-based network processors. The solution’s efficiency guarantees drastic reductions in both CAPEX and OPEX, and the low-latency data path enables profit-generating backhaul services. The result is exceptional performance per dollar value.

### 200Gbps UPF Data Plane on FPGA

The 5G UPF solution provides hardware offloading of network forwarding functions to the ACE-NIC FPGA and assures a deterministic performance with up to 200G line-rate throughput and low latency (3 μs). It also provides a high Quality of Experience (QoE) for multitenant solutions and future-ready programmability.

### Service Resource Utilization

By fully offloading resource-consuming network forwarding functions to the ACE-NIC FPGA, the ENET technology eliminates the heavy load from the CPU. This hardware acceleration means that under similar conditions there are many more resources available for user sessions with deterministic results, high throughput, and low latency.

### Reduced Power Consumption

By reducing the heavy load from the CPU to the ACE-NIC, the solution reduces compute resources dramatically, by a factor of 1:20. This also reduces the solution’s power consumption by 70%, which leads to ongoing OPEX savings.

### Reduces Solution Cost (CAPEX & OPEX)

The increased efficiency that this solution provides, with full offload to a SmartNIC, means that fewer devices are needed for the same UPF throughput. This effects a lower initial CAPEX. In addition, operational expenses are greatly reduced, because of the fewer CPUs needed and lower power consumption with this UPF solution.

### Reduced Time-to-Market (TTM)

The 5G UPF solution reduces development lead time, resources, and cost. TietoEVRY UPF software reduces TTM with its proven pre-integrated baseline so customers do not need to build their solution from scratch. The solution also ensures that the final UPF application adheres to the highest industry standards for quality, capacity, and standards compliance.

### Licensing

UPF licenses can be provided based on the number of instances, data rate, and feature content that the customer requires. TietoEVRY and Ethernity can also provide their UPF expertise to ensure smooth development of the final customer UPF application.

### System Configurations

SmartNIC	4 x SFP+ interfaces (40GbE) 2 x SFP28 (50GbE) 2 x QSFP28 interfaces (100GbE)
Flow Processor	Single Flow Processor switching capacity supports 120Gbps, enabling UPF offload of 100Gbps Dual Flow Processor instantiation will result in 240Gbps switching, and therefore 200Gbps UPF offload

Please contact your Ethernity sales representative for more detailed technical discussions of our solution’s key capabilities.