SD-WAN Acceleration

For nearly five years, SD-WAN (software-defined wide area network) has been successfully adopted by ever more enterprises to connect to branch offices via virtual private networks (VPNs) over the internet, saving them on both operating and capital expenses. Until recently, the SD-WAN virtualized network function (VNF) has run over DPDK with the use of general-purpose processors (CPUs) performing at sub-gigabit speeds, which was sufficient to support the required services and branch office VPN connectivity.

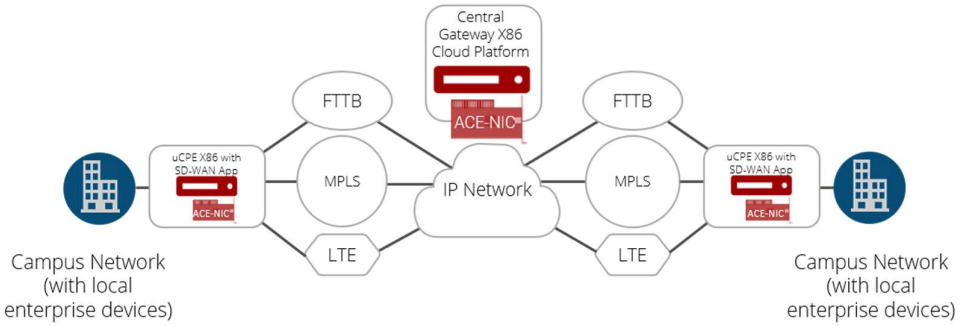
However, as SD-WAN has begun to be adopted as a service for branch offices, there is demand to deliver higher throughput of 10Gbps to 40Gbps to handle hub-and-spoke use cases such as telco central offices, data center-to-data center, cloud aggregation-to-endpoint, multiple dwelling units (MDUs), large business parks, and campus aggregation connections. When SD-WAN throughput is increased to higher than gigabit, it can no longer be handled exclusively in software, and many functions, such as IPSec, specific tunneling methods, load balancing, and SLA become inefficient and demand an upgrade to more powerful, more expensive systems that may even require modifications to the VNF software.

As opposed to new systems that involve a large initial investment and high power consumption, Ethernity Networks' SD-WAN Acceleration solution offers seamless acceleration by way of our unique FPGA SmartNIC. Ethernity utilizes DPDK APIs to enable connectivity to an existing VNF without the need to modify the software or the server/processors.

Ethernity Networks offers the optimal implementation for accelerating SD-WAN through its family of ACE-NIC FPGA SmartNICs, which not only instantly and

Solution Highlights

- Ideal for MDU and campus SD-WAN connectivity and for hub aggregation high-speed connections requiring 10G/25G/40G interfaces
- DPDK accelerating workloads for easy integration with existing SD-WAN software
- IPSec high-speed tunnel offload and termination
- Load balancing and efficient per-flow distribution
- Up to 1M flows with filtering, counters, and monitoring
- H-QoS and policing per user based on L3/L4 and tunnel fields



transparently increase throughput, but also futureproof the application with their programmability.

Furthermore, Ethernity's FPGA SmartNICs can be installed in existing uCPE appliances in the spoke deployments to provide higher bandwidth within the same SD-WAN solution, as well as load balancing, IP fragmentation and reassembly, high-speed IPSec VPN, MPLS, monitoring, SLA, and H-QoS without any infrastructure changes in a highly customizable platform at the edge of the network.

By using our field-proven ENET Flow Processor and standard DPDK APIs, Ethernity offers seamless offloading of the data plane to our ACE-NIC SmartNICs, assuring accelerated deterministic SD-WAN performance at an extremely competitive price. The solution achieves better performance while reducing networking overhead, lowering costs with its small footprint and low power requirements, and providing programmability to enable easy adjustments for any required future integration.

Solution Features

Enhanced Security

At a bare minimum, SD-WAN solutions must provide encryption/decryption, DDoS protection, firewall, and policy-based security. Today, though, most SD-WAN designs leverage Internet Protocol Security (IPSec) as the default for link encryption and VPN tunneling requirements. Most IPSec encryption engines are limited by the overall solution throughput, and existing solutions cannot provide efficient IPSec at the higher speeds that today's use cases demand. Ethernity's SD-WAN Acceleration handles IPSec with 10/25/40G bandwidth within the FPGA SmartNIC as an aggregation element for termination of many CPE device tunnels in a single point.

SLA

SD-WAN solutions must provide the capability of setting policies for Service Level Agreements (SLAs) for performance (latency, jitter, and packet loss) and Quality of Service (QoS). However, once performance requirements exceed 1Gbps, SD-WAN software solutions cannot implement SLA support at wirespeed. Ethernity's FPGA SmartNIC offers flow filtering for millions of flows with 10 counters per flow, as well as fault monitoring (such as continuity check and delay and latency measurement), to provide zero-loss packet monitoring and tapping. This means SLA support is a native feature of the solution, even at speeds of 10/25/40Gbps.

Branch Aggregation

As the number of enterprise branch offices grows and as they are connected to a single isolated sliced part of a hub, and as the demand for bandwidth also grows with the need for extended data communication and video processing, the aggregation center requires an especially high amount of bandwidth. Moreover, many services today require very low latency. To meet these requirements without significantly impacting the existing infrastructure, an FPGA SmartNIC is the ideal solution, as it offloads and terminates the data processing within the NIC. The aggregation point transparently and seamlessly receives up to 80Gbps of deterministic throughput with extremely low latency from nothing more than an interchangeable card, without the need to add servers or racks and with virtually no added power consumption.

Specifications

Ethernet
- IPoE
- IPoEoVLAN
- IPoEoQ

IP Routing
- IPv4/IPv6 static/dynamic routing
- PBR

Multicast
- IPv4/IPv6 multicast routing

IP Gateway
- NAT (1:1, N:1), multi-NAT
- PAT (1:1, N:1)

VPN
- VxLAN
- IPSec
- VxLAN over IPSec
- GRE, mGRE

WAN
- 1:1 standby protection
- Intelligent routing based on:
  - SLA-based applications
  - Link quality
  - User policy
- WAN monitoring link quality
  - Packet loss
  - Delay
  - Jitter

Security
- IPSec
- 802.1x certification
- MAC certification
- DHCP option 82
- IP Source Guard

H-QoS
- Traffic classification based on:
  - Port
  - MAC address
  - IP address
  - IP
  - Priority
  - DSCP priority
  - TCP/UDP port number
  - Protocol type
- Hierarchical traffic policing
  - 2r3c policer per port of per flow
  - WRED
- Remarking
  - 802.1p
  - DSCP
- Hierarchical queue scheduling
  - PQ
  - WRR

Reliability
-
- VRRP
- VPN fast failover detection

Timing
- 1588v2 BC, TC
- SyncE
- ToD interface

Load Distribution
- LAG
- ECMP

Management and Maintenance
- BFD
- OAM/CFM
- sFlow
- IP SLA
- RMON
- Flow counters
- Queue counters

System Configurations

ACE-NIC SmartNIC	4 x SFP+ interfaces (10GbE) 2 x SFP28 (25GbE) 2 x QSFP28 interfaces (40GbE)

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