Orthogone

Mastering Ultra-Low Latency:
The Technical Blueprint of FPGA and Software Hybrid Solutions

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STAC
SECURITIES TECHNOLOGY ANALYSIS CENTER

AMD Adaptive Computing Partner PREMIER

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Architectural advantages of Hybrid Solutions

BALANCE THE FLEXIBILITY OF SOFTWARE-BASED SOLUTIONS AND THE PERFORMANCE OF HARDWARE-BASED SOLUTIONS

Software-based solutions

- Lower cost
- Greater flexibility
- Optimal for prototyping and testing trading strategies
- Higher latency
- Lower performance

Hardware-based solutions

- Including ASICs, eFPGAs, and FPGAs
- High-performance processing
- Ideal for high-frequency trading with low latency and high throughput
- Less flexibility

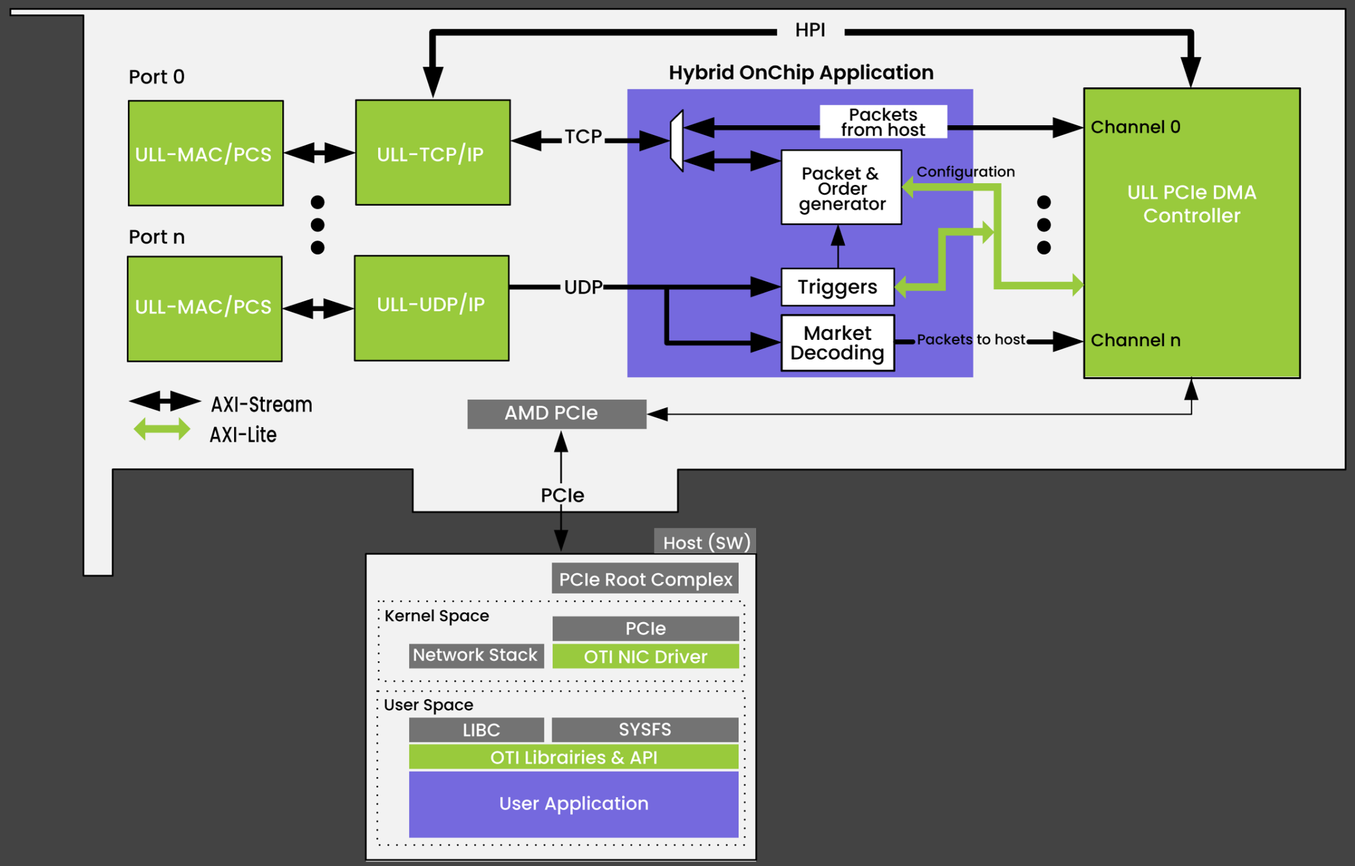
Hybrid-based solutions

- Combine FPGA and software-based components
- FPGAs accelerate specific functions and algorithms while the CPU handles general-purpose and complex trading algorithms
- Highly flexible, delivering very low latency performance
- Easy customizability

ULL PCIe DMA Controller

Hybrid Solutions

CUTTING-EDGE IP CORE ENABLING LIGHTNING-FAST BIDIRECTIONAL DATA TRANSFER BETWEEN THE HOST CPU AND FPGA



- Both FPGA and Host processor can send packets to TCP core
- Protocols not handle by the TCP and UDP cores are forwarded to Host processor through HPI channel
- Configurable parameters at build time:
  - Number of channel
  - Number of Queue on each channel
  - Size of queues per channel
  - Channel mode: synch or asynch.
- Latency optimized RTT around 640ns

NOT STAC BENCHMARKS

ULL PCIe DMA Controller
Software Tools

ULL PCIe DMA Controller software description

- Driver and library
  - Linux kernel module provided with standard delivery packages (rpm, deb)
  - Driver created to automatically detect PCIe card for early evaluation solution
  - Library API easily handles buffer creation, transmission and reception
- Software tools
  - Test application provided for latency measurement
  - Application will configure and report measurement executed by FPGA application

FPGA IP Solutions Offering

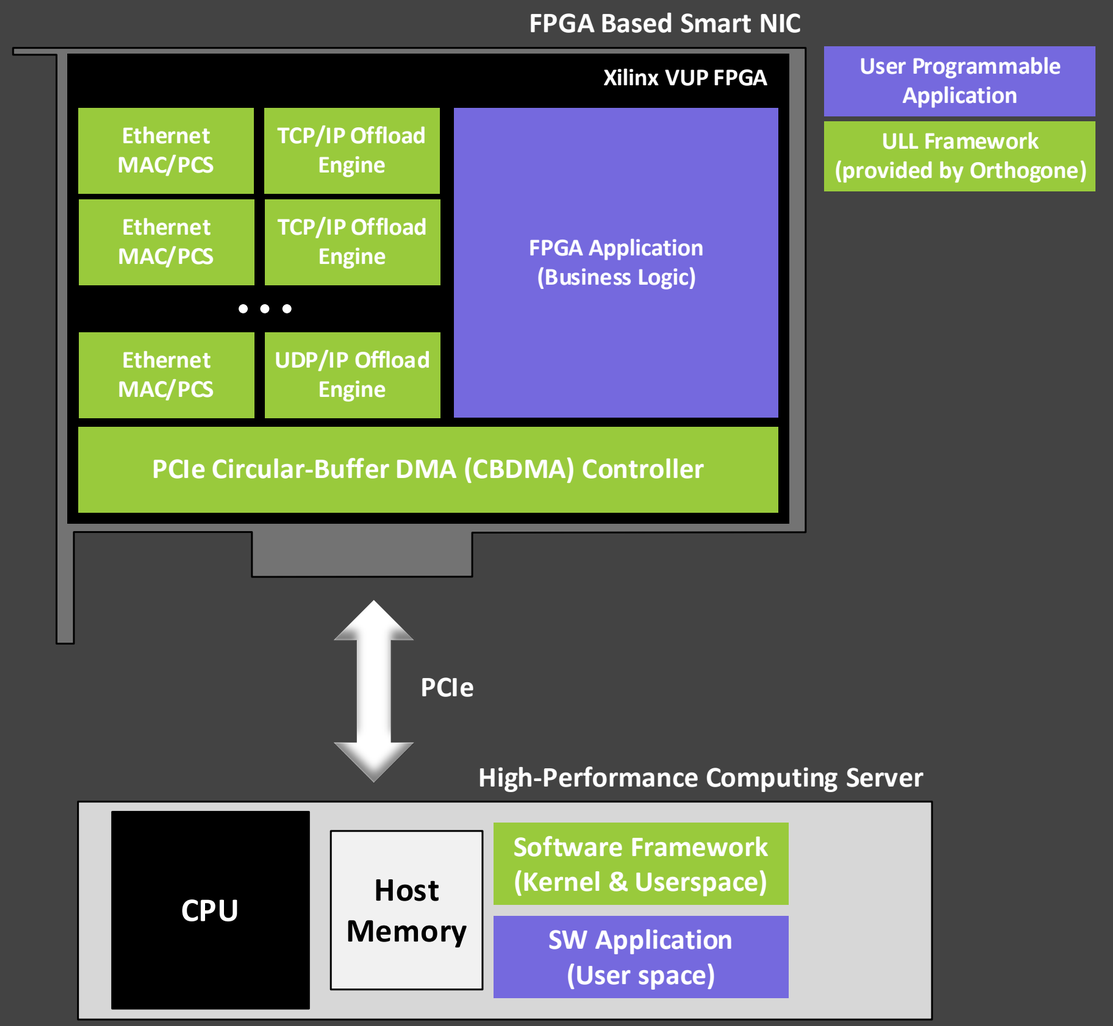
ULTRA-LOW LATENCY NETWORKING SOLUTIONS

ULL FPGA Framework

- Best-in-class FPGA and SW solution to develop reconfigurable applications that require ultra-low latency performances.
- Specifically designed for trading applications
- Full suite of ULL FPGA IP cores
- FPGA Dev kit (design & simulation environment, reference design examples, debug tools, etc.)
- SW Framework (drivers, API, debugger, etc.)

ULL FPGA IP Cores

- Ethernet MAC/PCS (1 – 100G) with opt. RS-FEC
- TCP/IP Offload Engine
- UDP/IP Offload Engine
- PCIe Streaming DMA Controller



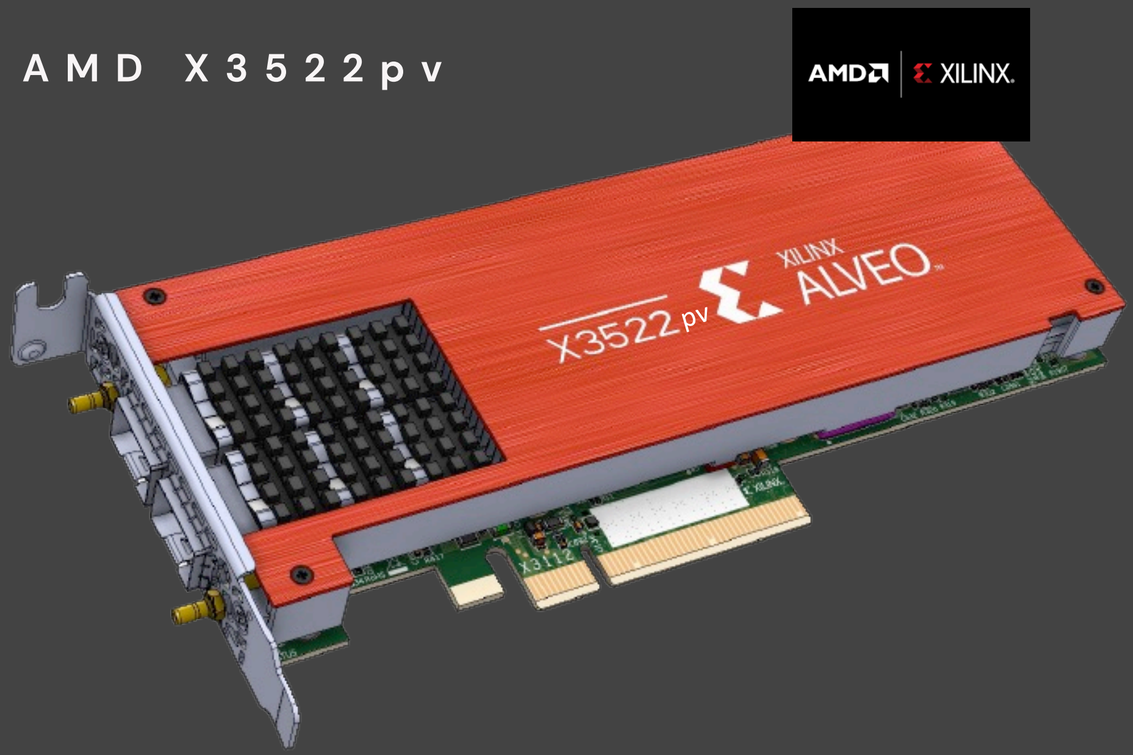
ULL FPGA Framework

Hardware Platforms

Can be ported on other UltraScale+ platforms

AMD UL3524

AMD X3522pv



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Orthogone Overview

Developers of the Seemingly Impossible

Orthogone offers highly specialized engineering solutions focused on the design of innovative products requiring in-depth knowledge of software development, embedded systems, FPGA and SoC.

95+
Multidisciplinary R&D Team

2007
Inception

Privately Held Headquartered in Montreal (Canada)

FPGA
Solutions & IP Cores Technologies

R&D Services

- Systems engineering
- Software development
- Hardware design
- FPGA Design & Verification

Key Industries

- Datacenter & Comms
- Defense & Aerospace

FPGA IP Portfolio

- ULL FPGA Framework
- Ethernet MAC/PCS/FEC
- TCP/IP Offload Engine
- UDP/IP Offload Engine
- PCIe CBDMA Controller

Ecosystem of Technology Partners

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