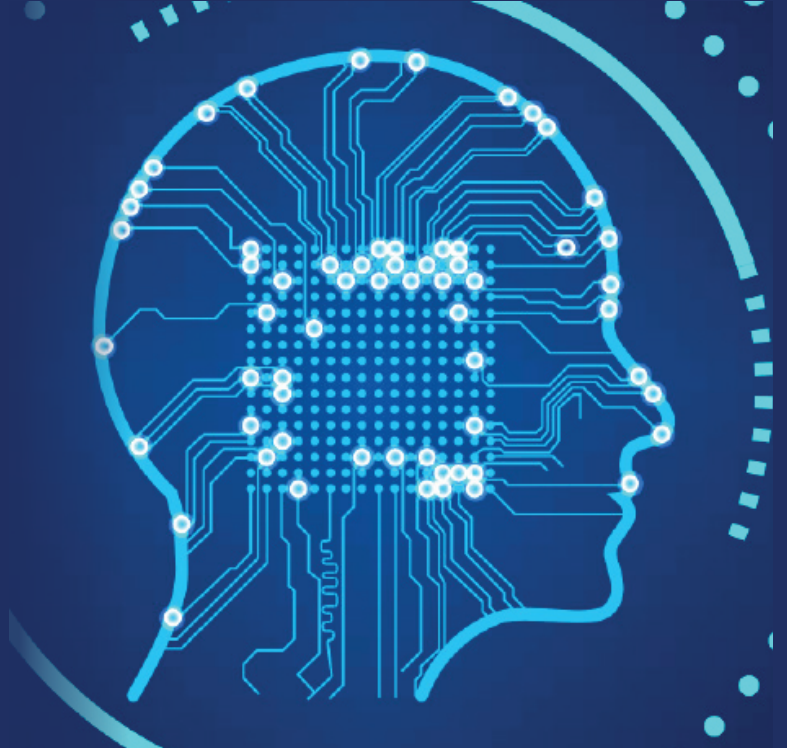


# NVM Express Controller



Highly Configurable

Technology Independent

System Validated

## Overview

Mobiveil's Universal NVM Express Controller (UNEX) is highly flexible and configurable design targeted for both Enterprise and client class solutions that unlock the current and future potential of PCIe-based SSDs. The UNEX controller core efficiently supports multi-core architectures ensuring thread(s) may run on each core with their own queue and interrupt without any locks required. It provides support for end-to-end data protection, security and encryption as well as robust error reporting and management capabilities. The controller architecture is carefully tailored to optimize link and throughput utilization, latency, reliability, power consumption and silicon footprint.

Mobiveil's UNEX controller can be used along with Mobiveil LDPC, DDR4/3 (UMMC) and Enterprise Flash controller (EFC) IPs for a complete NVMe/SSD implementation.

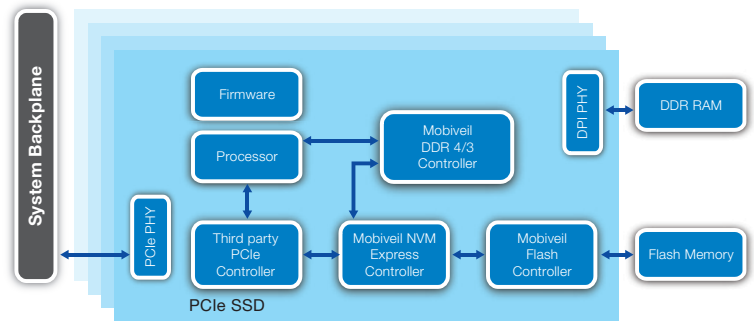
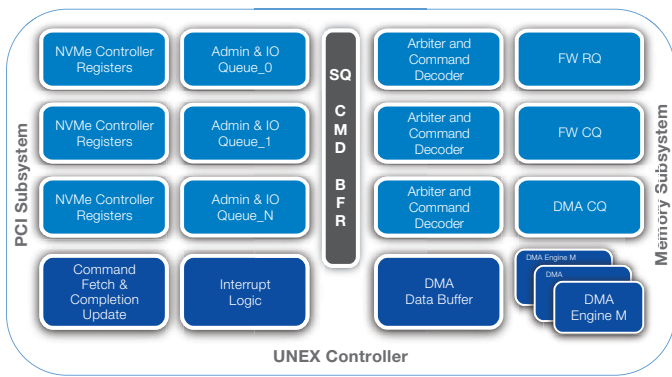
The UNEX controller comes with 3<sup>rd</sup> flavors part:

- Native UNEX Controller with proprietary control and Data path interfaces
- UNEX Controller with AXI Control and Data path interfaces for easy adoption in an SoC implementation
- UNEX Controller with Streaming Control and Data path interface (AXI4 ST) for easy adoption in an SoC implementation with PCIe HIP or any third party PCIe Controllers

UNEX Controller design is independent of implementation tools and target technology. Mobiveil solution allows the licensees to easily migrate among FPGA, Gate array and Standard cell technologies optimally.

## Features

- Compliance to NVM Express 2.0 Specification
- Compliant with AXI4-ST/AXI Interface towards PCIe interface
- Compliant with AXI4 interface towards memory subsystem interface
- Internal data path width: 128/256/512 bit
- Host memory page size support of 128 MB
- Support for round robin or weighted round robin with urgent priority arbitration Mechanism
- Supports for configurable number of IO queues
- Supports all optional admin commands
- Supports all optional NVM commands
- Supports Multipath IO and namespace sharing capabilities
- End-to-end Data protection support
- Supports Multiport Configuration for Multipath IO Support
- Supports for configurable queue depth
- Configurable number of DMA Engines
- Efficient and streamlined command handling
- Well defined command interface for local CPU to perform sub system initialization and to handle all non-hardware
- Support for Zoned namespace command set and Key Value command set
- E2E protection(16b / 32b / 64b) Support
- Supports Copy command and Lock Command



- Status : Gold
- Availability : Available now
- Language : Verilog
- Synthesis : DC, Genus, Quartus, Vivado
- Simulation : Cadence, Synopsys, Mentor
- Technology : 90nm ASIC or better, FPGA

## Specification

### Configurable Options

- Multi-port or Single Port
- Inclusion/Exclusion of AXI/Streaming interface modules
- Number of IO Queues
- IO Queue Depth
- Number of DMA Engines
- Number of Non Volatile Memory Channels
- Data Path Widths (64, 128, 256, 512)
- Data Buffer Size

### Design Attributes

- Highly modular and configurable design
- Layered architecture
- Fully synchronous design
- Supports both sync and async reset
- Software control for key features
- Multiple loop backs for debug

### Product Package

- RTL Code
- UVM based test bench and behavioral models
- Test cases
- Protocol checkers, bus watchers and performance monitors
- Configurable synthesis shell
- NVM Device FW Stack

### Documentation

- Design Datasheet
- Verification Guide
- Synthesis Guide
- NVM Device FW API User Guide

### Licensing Option

- NVMe Controller (UNEX)

## About Mobiveil

Mobiveil is a fast-growing technology company that specializes in development of Silicon Intellectual Property (SiP), platforms and solutions for AI/ML, Flash Storage, Data Center, 5G Telecom, Automotive and Industrial IOT applications. The Mobiveil team leverages decades of experience to deliver high-quality, production-proven, high-speed serial interconnect SiP cores, and custom and standard form factor embedded platforms to leading companies worldwide. With a highly motivated engineering team, dedicated integration support, a flexible business model, strong industry presence through strategic alliances and key partnerships, Mobiveil solutions add value to users by matching their product goals on time and within budget. Mobiveil is headquartered in Silicon Valley with engineering development centers located in Milpitas, CA, Chennai, Bangalore and Hyderabad, in India, and sales offices and representatives located in the U.S., Europe, Israel, Japan, Taiwan and the People's Republic of China.

## Contact Sales and Support

Mobiveil, Inc  
890 Hillview Court, Suite 250  
Milpitas, CA - 95035  
email: [sales@mobiveil.com](mailto:sales@mobiveil.com)  
[www.mobiveil.com](http://www.mobiveil.com)

January 2024 | Version 1.7