![KALRAY logo]

## APPLICATIONS

- Smart JBOF
- Disaggregated Storage
- HPC Storage
- Enterprise data centers

## CONFIGURATIONS

- NVMe-oF RoCEv1/v2 *for demanding infrastructures using RDMA technology*

- NVMe/TCP *for ease of deployment, cost effective storage disaggregation, re-using existing TCP infrastructure*

## KEY BENEFITS

### Storage Disaggregation
- *Access massive pool of storage from any compute node*
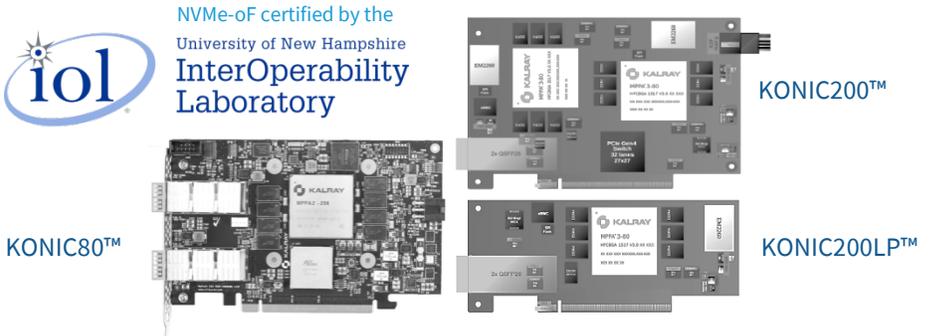- *Scale up and balance compute and storage capacity independently*

### Adapt to RoCE or TCP
- *Single NVMe-oF configurable card*
- *Support either RoCE or TCP*
- *Reconfigurable in the field*
- *Streamlined supply management*

### High-Performance, High-Density, Low-Power JBOFs
- *Reduce power consumption by 50%*
- *Increase SSD density by 2.7x*
- *Deliver up to 6x more throughput*
- *Add additional compute-intensive composable functions*

# KALRAY's TARGET CONTROLLERS (KTC™)

## NVMe-oF & NVMe/TCP SmartNIC Solutions

## PRODUCT BRIEF

Kalray Target Controller (KTC™) is a scalable and composable solution to build low-latency and low-power advanced storage nodes. It enables the design of cost-effective smart NVMe-oF JBOFs by integrating the complete I/O path and data processing into a single MPPA™ board. To deliver a complete 24-SSD solution supporting either NVMe-oF (RoCE) or NVMe/TCP, this architecture requires only one management board, associated to 1-6 KONIC™ boards. Higher performance, reduced power consumption, increased SSD efficiency and optimized Total Cost of Ownership are the benefits from the KTC™ solution.



NVMe-oF certified by the University of New Hampshire InterOperability Laboratory

KONIC200™
KONIC80™
KONIC200LP™

### KTC Hardware Specifications

| Features | KONIC80™ | KONIC200 / 200LP™ |
|---|---|---|
| Ethernet speed | 2 x 40GbE | 2 x 100GbE |
| Typical power consumption | 35W | 35W (HHHL) / 60W ( FHHL) |
| Form factor | FHHL | FHHL or HHHL |
| Interface | PCIe Gen3 x16, 2xQSFP+ | PCIe Gen4 x16, 1xQSFP-DD |
| DDR | 2x 2GB DDR3-1666 | 2x 4GB DDR4-3200 |
| Processor | MPPA®2-256 (BOSTAN) | MPPA®3-80 (COOLIDGE) |

### KTC Performance

| 4-KB Random Operations | KONIC80™ | KONIC200/200LP™ |
|---|---|---|
| 100% Read | 2.2 MIOPS | 6 MIOPS |
| 100% Write | 2.2 MIOPS | 6 MIOPS |
| 70% Read / 30% Write | 2.5 MIOPS | 9 MIOPS |

## Unique solution for NVMe-oF (RoCE) and NVMe/TCP

The high programmability of the Kalray Target Controller (KTC™) makes it a unique solution that supports both protocols with similar level of performance. Achieving the lowest latency, NVMe-oF (RoCE) is the ideal solution for infrastructure using RDMA technology.

NVMe/TCP brings the opportunity to disaggregate storage and compute nodes in infrastructures using regular TCP, re-using existing NICs and switches.

KTC™ is the only NVMe/TCP solution that eliminates the need for an additional host CPU and memory, while increasing the I/O throughput of a JBOF. Lowering the system cost and delivering 6 times more performance, KTC™ optimizes the storage nodes.

## Composable SmartNIC

Leveraging the MPPA™ manycore processor and the KONIC™ PCIe cards from Kalray, the optimized software can free up more than 30% of the powerful compute capability (several 10's of MPPA™ cores) to integrate composable advanced functionalities. These cores can massively offload the remote initiator, performing functions like encryption, erasure coding or signature handover deduplication. KTC™ makes JBOFs smarter by executing in-situ computing, running I/O-intensive applications closer to the storage capacity, saving significant network bandwidth.

## High Availability & Scalable Performance

KTC™ solutions support redundancy paths for fault-tolerant architecture. As shown below, a pool of U.2 NVMe Gen4/Gen3 SSDs is typically connected to two NVMe-oF KONIC™ boards through two PCIe switches, creating a fully redundant path from the initiator servers to the final SSD targets. Support for active-standby or active-active mode is improving system performance while retaining high reliability.

By adapting the number of SSDs in this pool, the system architecture can be aligned to a variety of storage-capacity-to-throughput targets. Replicating this basic building block inside a JBOF system, the performance is perfectly balanced while ensuring High Availability (HA).
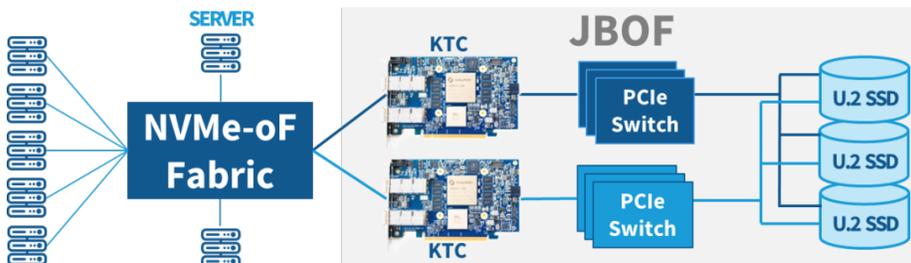


## KEY FEATURES

- NVMe-oF (RoCEv1/v2)
- NVMe/TCP
- NVMe-oF Pass-through
- DCBx
- Supports up to 2048 initiators
- Unlimited number of namespaces
- High Availability
- Active/active & active/standby
- Linux multipath support
- T10 DIF in pass-through mode
- PCIe Hot plug support
- PCIe bifurcation up to 4x4 lanes
- Supports up to 64 SSDs
- Daisy chaining to link several JBOFs
- Configurable System Management control
- Static configuration for storage orchestration
- In-band or out-of-band system management
- JBOF system monitoring using SMBUS/I2C or NVMe-MI
- Redfish/Swordfish or OpenBMC
- JTAG debug support
- LED for link status

## ENVIRONMENTAL

- Operating temperature: 0°C to 40°C
- Airflow: 600 LFM
- RoHS compliant

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