

## KEY BENEFITS

### **PCIe Gen5 Hyper-Connectivity:**

Experience ultra-fast data transfer with PCIe Gen5 x16 and low latency for critical applications.

### **Photonic Density**

**Revolution:** Leverage two or four CPO 2.0 connectors with 8 MPO16 fiber channels, delivering 1.6 or 3.2 Tbps throughput per card.

### **Scalable Deployment:**

1-2 cards per server supporting up to 32 GPUs per host.

### **Versatile Compute**

**Paradigms:** Adapts the GPU environment to match workload needs, using multi-generational and multi-vendor architectures.



## Overview

Drut's Initiator Fabric Interface Card (FIC) 2500 is an advanced photonic fabric card designed to revolutionize application workload acceleration using PCIe remoting technology. This next-generation card, part of the FIC 2500 Family, is fully compatible with PCIe Gen5 x16, enabling high-speed connections between PCIe resources and servers equipped with FIC 2500 cards.

Each FIC 2500 is equipped with either two or four Co-Packaged Optics (CPO) 2.0 connectors, providing eight (8) independent connectivity channels per connector. This advanced optical technology replaces the previous generation's pluggable modules, dramatically increasing bandwidth capacity.

The card utilizes MPO16 fiber cables, allowing for direct connection of 16 single-mode fiber connectors for a total bandwidth of 1.6 or 3.2 terabits.

The FIC 2500 requires a full-height, half-length PCIe Gen5 x16 slot and can be deployed with one to two cards per server. It is designed for compatibility with any off-the-shelf server with available PCIe slots. The card connects to a target fabric interface card (tFIC 2500) within the Drut PRU 2500 or other compatible resource chassis, offering 2x8 or 1x16 PCIe lanes per resource.

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### Optical Fabric Disaggregation:

Break free from traditional constraints with advanced optical connectivity.

### TCO Optimization:

Decouple resource and server upgrades for flexible, ROI-driven enhancements and future-proof infrastructure.

This configuration supports up to 32 GPUs per bare metal server (host), making it particularly well-suited for AI and high-performance computing applications that require increased computational power and memory bandwidth.

## FIC 2500 Target Applications

The FIC 2500 is a key building block of Drut's Gen 5 PCIe DynamicXcelerator fabric. It is used to disaggregate Gen 5 servers connecting the host to a large pool of PCIe resources over a photonic fabric under software control. This technology enables hardware resources to be composed into software defined systems. Some of the valuable use cases for the FIC 2500 are as follows:

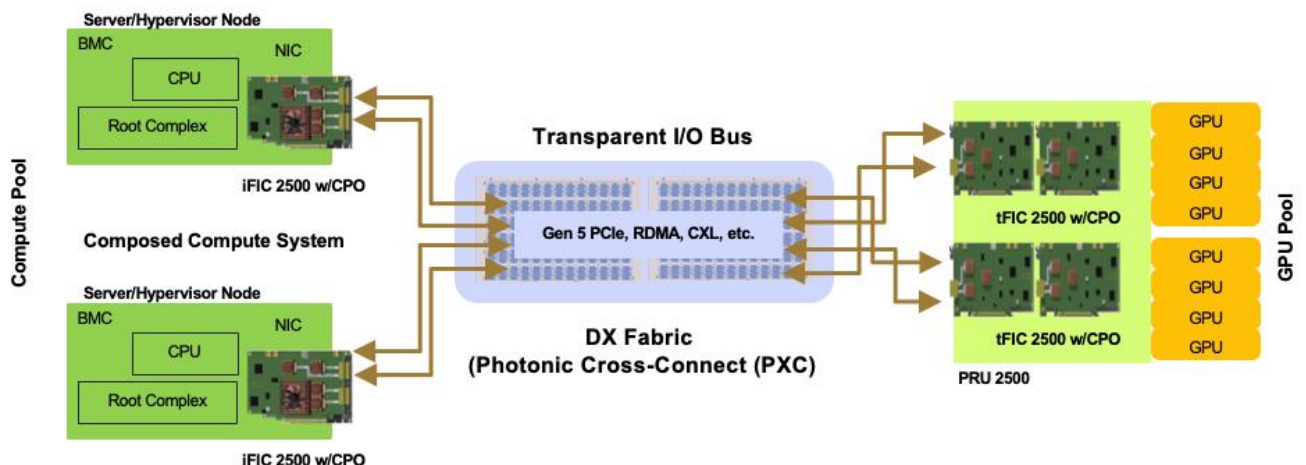
- GPU Farms for AI/ML Inference Workloads
- Photonic HPC Clusters
- Storage pools
- FPGA Farms for Trading
- High-performance private cloud for IaaS

## FIC 2500 Use Case

### PCIe Remoting:

- **System Architecture:** The FIC 2500 leverages an advanced optical fabric to interconnect servers and resources, using cutting-edge photonic technology.
- **Dual-Port Configuration:** Each FIC 2500 utilizes 2 or 4 co-packaged optics (CPO) connectors, providing 8 independent channels per connector. This best-practice configuration maximizes both bandwidth and redundancy.

## FIC 2500 Use Case Diagram



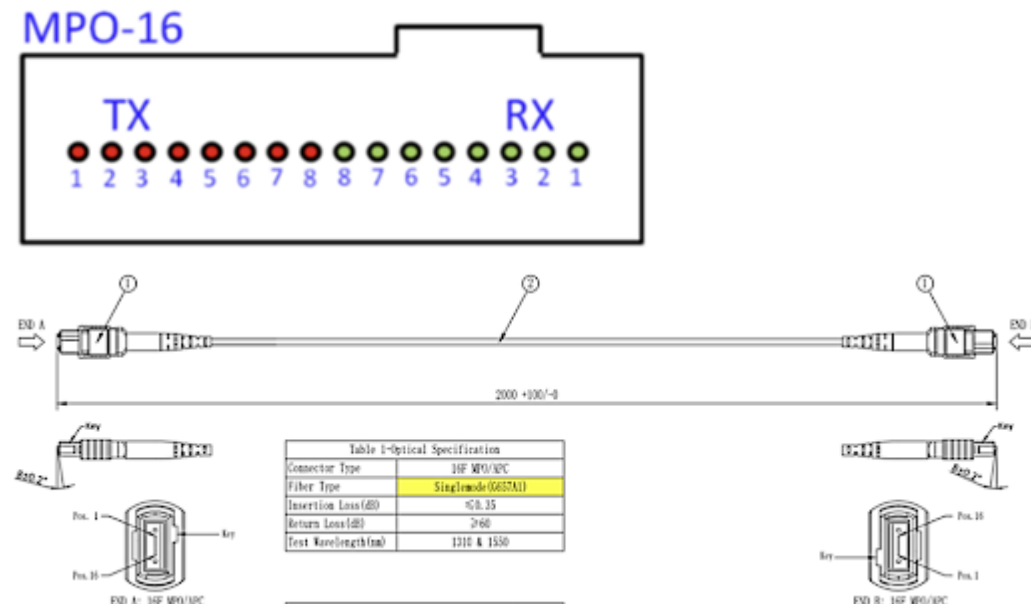
- **High-Speed Connectivity:** The FIC 2500 interfaces with the photonic fabric using single-mode fiber and MPO16 connectors, ensuring high-speed, low-latency data transmission.
- **Scalable Resource Allocation:** Deploy 1 or 2 FIC 2500 per server, in one of two modes x8 or x16. This flexible setup allows for scalable resource allocation tailored to specific needs.
- **Dynamic Resource Management:** Drut's Fabric Manager (DFM) oversees the ecosystem, orchestrating a dynamic resource pool. Its intelligent management system enables seamless on-demand machine provisioning by attaching and detaching resources as needed, optimizing utilization and enhancing overall efficiency.

## Management and Control:

- SMBus
- MCTP Over SMBus - BMC and MCTP over PCIe to Host OS
- PLDM for Monitor and Control
- PLDM for Firmware update
- I2C interface for device control and configuration
- GPIOs
- Debug Interfaces (USB-Type C/UART)

## Fiber Map, MPO Cable Diagram

Physical Fiber Assignment:



**FIC 2500 Specifications**

Component	Details
PCIe Gen	5.0
Host Interface	PCIe Gen5.0 x16
Fabric Interfaces	CPO 2.0 via MPO16 cable SMF
Wavelength Range	1304.5nm(min), 1311nm(nom), 1317.5(max)
Supported Line Rate	NRZ (32G/lane x16 lanes) or NRZ (32G/lane x8 lanes)
Number of Ports	1 or 2 MPO16, via 2 CPO connectors
Card Form Factor	FHHL (Full Height Half Length) PCIe Gen 5.0 slot
Power	<70 W
Compliance	RoHS, EN-55032
Operating Voltage	+12V
Hardware Warranty	1 year standard, 3 years extended.
Chassis Support	PRU 2500
Cable Support	MPO16
Operating Conditions	Operating: 10°C to 55°C, 20 to 80% non-condensing. Airflow: 200 LFM. Storage: -45°C to 105°C, 5 to 90% non-condensing

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