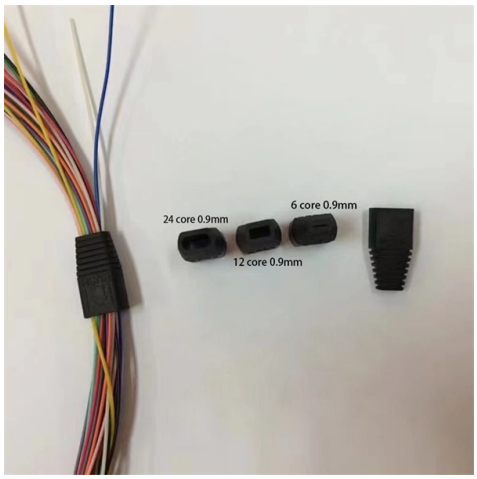
Fiber optic FC interface FPGA



Overview

FH1223 extends four SFPs, with each SFP having a set of TX and RX connected to the transceiver pins.

Key Takeaways

Fibre Channel (FC) interfaces can be implemented on FPGAs using SFP/SFP+ modules and FMC carrier boards, enabling high-speed optical communication for data center and industrial applications. FPGA-Based Fibre Channel ImplementationFibre Channel (FC) is a high-speed network protocol primarily used for storage area networks (SANs). Implementing an FC interface on an FPGA typically involves: High-speed transceivers: FPGAs with multi-gigabit transceivers (MGTs) are required to handle FC data rates, such as 8GFC or higher.

SFP/SFP+ modules: Small Form-factor Pluggable (SFP) or SFP+ optical modules provide the physical fiber interface. Each module has separate TX and RX pins connected to the FPGA transceiver pins.

FM

C carrier boards: FPGA Mezzanine Cards (FMC) like the Samtec 14 Gbps FireFly™ FMC or ALINX FH1223 provide standardized interfaces to connect multiple fiber channels to an FPGA, supporting protocols including Ethernet, InfiniBand, Aurora, and Fibre Channel.

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FPGA I

P cores: The FC protocol stack, including frame handling, flow control, and link initialization, can be implemented in FPGA logic. Open-source projects like Fejkon demonstrate a basic FC HBA implemented on an FPGA, supporting 4x 8 Gbit/s FC ports over PCIe.

Design Considerations

Clocking and Synchronization: High-speed FC requires precise clock management and low-jitter PLLs to maintain signal integrity. Data Buffering: FIFOs and streaming interfaces are used to handle bursts of data and align with the FC protocol timing. Optical Interface: Multi-mode or single-mode fiber can be used depending on distance requirements.

Typical SFP/FC interfaces support distances from 100 meters (multi-mode) to 20 km (single-mode),.

FPG

A Resources: Implementing FC requires sufficient logic cells, MGTs, and memory blocks to handle frame processing, error detection, and flow control.

Practical Examples

Fejkon Project: Demonstrates a DE5-Net FPGA board configured as a basic FC HBA, capable of 4x 8 Gbit/s ports, using quad SFP+ modules.

Samtec Fire

Fly FM

C: Provides up to 140 Gbps full-duplex bandwidth over 10 channels, supporting FC and other high-speed protocols for FPGA-to-FPGA or FPGA-to-network communication.

ALIN

X FH1223 FMC Card: Extends four SFPs to an FPGA carrier board, each with TX/RX connections, suitable for high-speed optical data transfer.

Summary

To implement a Fiber Channel interface on an FPGA, you need: FPGA with high-speed transceiversSFP/SFP+ optical modules for the fiber interfaceFMC or custom carrier boards for connectivityFPGA logic or IP cores to handle FC protocolProper clocking, buffering, and signal integrity design This setup enables high-speed, low-latency optical communication suitable for storage networks, industrial automation, and data center applications.

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Article Content

Design and Implementation of an FPGA-Based 10G Optical Fiber

To address the rapidly growing demand for high-speed data trans-mission between nodes in real-time distributed systems, this paper designs and implements a 10G optical fiber interface reflective mem

ALINX 4 * SFP+ Optical Fiber Interface FH1223 HPC FMC Card

FH1223 extends four SFPs, with each SFP having a set of TX and RX connected to the transceiver pins. FH1223 has a standard FMC HPC interface that can be connected to the ALINX FPGA carrier board

14 Gbps FireFly™ FMC™ Development Kit

Samtec offers a VITA™ 57.1 compliant, 14 Gbps FireFly™ FMC™ Module for connecting FPGAs to fiber optic cables for high-speed multi-gigabit transmissions.

Design Approach for a FPGA based Ethernet Bridge for Optical Fiber ...

The main aim of this paper is to present an approach to establish optical fiber communication by employing the standard IEEE 802.3 Ethernet and Optical Sensing circuits that can be implemented

Optical fiber link with Kintex-7 GTX and Xillyp2p

This guide shows how to set up a Multi-Gigabit Transceiver (MGT) on an AMD (formerly Xilinx) Kintex-7 FPGA, and how to connect it to a Xillyp2p IP Core. In this example, a GTX is configured; however

Xillyp2p: Connecting FPGAs with each other easily | xillybus

Electrical isolation (for safety of medical equipment) by communicating with a front-end FPGA through a fiber optic cable. Data link with peripheral equipment through a cable (cameras, displays, sensors,

FPGA Pro | FH1224 2x 40G QSFP+ fiber optic interface fiber optic ...

FH1224 is a 2-channel 40G QSFP+fiber optic module, with each fiber optic transceiver integrating 4 transmission channels and 4 reception channels. This 4-channel pluggable interface has a

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96-core optical fiber terminal box□sc/lc/fc/st fully ...

Not stable? the attenuation is soaring! confused by the disk? splicing is repeated and reworked! flange loose? it crashes every three days! until i took apart this "datang xinsheng 96-core

Hj-fiber Customized SC Flange Fiber Optic Coupler

This 2024 model SC port adapter custom flange fiber optic coupler ensures stable network connections in carrier grade equipment using a high-precision SC interface.

Handheld TL-560 Fiber Optic Power Meter 10MW Laser Light Source

The use of interchangeable optical port interfaces with FC, SC chief, more accurate measurement; Two AA batteries, low power design, long ; Rubber shell, increase protection performance, suitable for

Fibre Channel

Fibre Channel NICS, Switches and test and instrumentation devices for building, testing and simulating Avionics networks. FC-AE-ASM, FC-AE-RDMA, FC-AE-1553.

Research on Optical Module in FPGA Optical Fiber ...

2) Interface type: It needs to be matched with optical fiber interface, common optical module interface: FC type, LC type, SC type, ST type, MT type. 3) Transmission rate: Rate is one of

FPGA-Based Demonstrator for Real-Time Evaluation of a Fiber-Optic ...

Initially we were lacking information on the parallel interfaces and therefore the first milestone aims for enabling the four SerDes transceivers that are connected to the SFPs, e.g., by developing a loop

The Application of FPGA in Optical Fiber Sensing and ...

To obtain pulsed light signal used as pulsed pump light for optical fiber sensing and communication systems, a design scheme of generating pulsed light based on continuous laser and

ETSC OCI1300/1500 High-Precision OFDR Optical Coherence

Overview The ETSC OCI1300/1500 is a high-precision optical coherence interferometer engineered for full-parameter characterization of passive and active photonic components and fiber-optic networks

10 Pcs Quick Cold Connector Fiber Optic Cable Sc/Apc Fiber

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Fiber Optic Cable is suitable for various single-mode fiber connection scenarios. High Reliability: The fiber optic cable provides stable performance, suitable for various cold connection environments, is

Design Approach for FPGA based High Bandwidth Fibre Channel

Fibre Channel (FC) data transmission protocols are widely used as an interconnecting protocol to cater for the requirement of high-speed data transmission. FC has unique features like high bandwidth,

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This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

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