

Memory mapping of optical modules



AI Overview

Optical modules use structured EEPROM memory maps to store identification, configuration, diagnostics, and lane-specific data, with complexity increasing for higher-speed modules like QSFP-DD and CMIS-compliant devices.

Overview of Memory Mapping

Optical modules such as SFP, QSFP, QSFP28, and QSFP-DD contain small EEPROMs that store both static information (vendor, part number, serial ID) and dynamic diagnostics (temperature, voltage, TX/RX power) accessible via an I²C interface. Memory mapping allows the host system to read, configure, and monitor the module without interfering with high-speed data lanes.

SFP and QSFP Memory Organization

SFP Modules (SFF-8472): Memory is divided into blocks:

- A0h (256 bytes): Serial ID and vendor information (first 128 bytes), reserved space (second 128 bytes)
- A2h (256 bytes): Digital Diagnostic Monitoring (DDM) with real-time sensor data, alarm/warning thresholds, and calibration constants

Optional pages allow extended diagnostics or vendor-specific data.

QSFP/QSFP+ Modules (SFF-8636): Memory is organized into pages of 128 bytes within block A0h. Page 00h contains static module identity and capabilities, while additional pages support diagnostics, lane mapping, and configuration. Advanced QSFP-DD modules may include Bank Pages to manage multiple electrical and optical lanes.

High-Speed Modules and CMIS

For 400G/800G QSFP-DD and coherent modules, memory mapping is more complex due to multiple lanes and configurable applications:

- CMIS (Common Management Interface Specification)** defines memory pages for:
- Applications:** Up to 15 configurable transmission paths
- Data Paths:** Each path has a state machine controlling lasers, Tx/Rx CDRs, and signal integrity
- Control Sets:** Registers used by the host to configure and activate data paths
- Virtual Diagnostics Monitoring (VDM):** Observables like pre-FEC BER, ESNR, and lane-specific thresholds

Memory pages are used to advertise supported applications and VDMs, and hosts read/write registers t...

Article Content

Post 86 of 127 : Transceiver Firmware and CMIS

Every pluggable optical transceiver is a small embedded system. It has a microcontroller, firmware, a structured memory map, and a management interface. A QSFP-DD module running

The Most Comprehensive Guide Of Optical Modules

Explore the ultimate guide to optical modules. Learn types, functions, performance metrics & how to choose the right module for your fiber network.

How to Read SFP & QSFP EEPROM Data — Practical

Reading that EEPROM is the most reliable way to verify compatibility, identify mismatched optics, and diagnose link problems before you start swapping

Optical module design resources | TI

View the TI Optical module block diagram, product recommendations, reference designs and start designing.

Quick Reference Guide for Programming the DS1873 SFP+ Controller

This programmability necessitates a large register memory map. The application note provides an alternate view of the register map, which is convenient when programming the device.

What are I2C, MDIO and CMIS Access in Optical Transceivers?

What are I2C, MDIO and CMIS Access in Optical Transceivers? Allows access to optical transceivers' register pages (memory map) to Read their status and Write (program) their configurations.

Optical Quantum Memory and its Applications in Quantum ...

Optical quantum memory is typically based on single photon storage, and two single photon storage devices in an interferometrically stable system can store the quantum state of an encoded photon.

How does the latest optical module management standard work?

It is a way of aggregating and mapping the transmission paths (lane) on the optical and electrical side and the hardware resources of the module intended for one application.

54. What is memory and memory-mapped I/O in an

The method in which input/output (I/O) and memory share the same address space, allowing the CPU to directly access and write to them, is called

SFF Committee documentation may be purchased in hard copy or

Pluggable modules such as the SFP+, SFP28 and future SFP form factor that are compliant to SFF-8431, SFF-8419 and SFF-8472 may use this management interface; hereafter referred to as SFP+.

Optical RAM and integrated optical memories: a survey

nologies, mainly focusing on bit-level volatile and non-volatile optical structures and on roadmaps for trans-forming these elementary optical memory modules into practical optical RAM cell layouts.

From Custom SRAM to Optical SerDes: How Marvell

Marvell Leads AI Chip Infrastructure Innovation: A Full-Stack Transformation from Custom XPU to Optical Interconnects With the explosive

SFP Form Factor: SFF-8472 I²C Memory Map & Registers

This article explores how the SFP memory map is organized, how registers function, and why this structure is essential for monitoring, management, and reliable operation of optical modules.

Optically connected memory for disaggregated data centers

OCM uses conventional DIMMs and memory controllers, electro-optical devices, and optical fibers to connect the computing cores to the memory modules. Our work explores the idea of

Machine Learning Models for a Novel Optical Memory

In recent years, there has been growing interest in optical data processing, driven by the demand for high-speed and high-bandwidth data

TI DLP® System Design: Optical Module Specifications

ABSTRACT The objective of this application note is to help product developers better understand optical module specifications and related system design considerations. This information helps expedite

CMIS Explained | Common Management Interface for

CMIS is the modern, extensible management interface for high-performance optical modules across form factors and data rates. It enables

Memory organization in SFP, QSFP, XFP and OSFP transceivers

Using device with suffix allows you to program any area in memory map. In this tutorial I'll show you what's typical memory organization for SFP, QSFP and XFP modules based on

Optical RAM and integrated optical memories: a survey

This article reviews state-of-the-art integrated optical memory technologies and optical RAM cell demonstrations describing the physical

Optical mapping

Optical sequencing is a single molecule DNA sequencing technique that follows sequence-by-synthesis and uses optical mapping technology. Similar to other single molecular sequencing

Optical module

An optical module is a typically hot-pluggable optical transceiver used in high-bandwidth data communications applications. Optical modules typically have an electrical interface on the side that

UNIT 6 MEMORY ORGANIZATION Memory Interleaving

External Memory or Secondary Memory Comprising of Magnetic Disk, Optical Disk, Magnetic Tape i.e. peripheral storage devices which are accessible by the processor via I/O Module.

Optical RAM-enabled cache memory and optical routing for chip ...

In this article, we review our recent work in WDM-enabled optical RAM bank architectures and their optical all-passive peripheral modules that form a complete 16GHz optical cache memory physical

SFF Committee documentation may be purchased in hard copy or

If this bit is set to 0, then the module behaves like a standard tunable module. Tuning can be performed by writing to Bytes 144-145 or 146-147 consistent to module advertisement.

Charting the Path Toward 1.6T and 3.2T Optical Module

Also, the direct 1:1 mapping between electrical and optical I/O speeds enabled by 200G/lane signaling from the application-specific integrated circuit (ASIC)

Contact Us

For more information, pricing, or custom solutions, please contact us:

Website: <https://www.tomor.eu>

Email: info@tomor.eu

Phone: +49 69 2381 5497

Address: Am Hauptbahnhof 10, 60329 Frankfurt am Main, Germany

This document is for informational purposes only. Specifications subject to change without notice.

