LIGHTCOUNTING

HIGH-SPEED ETHERNET OPTICS

10TH EDITION | SEPTEMBER 2020

Source: Equinix via Data Center Frontier

©Copyright 2020 LightCounting • www.lightcounting.org

Table of Contents

Table of Contents 2
Abstract 4
Executive Summary 5
Chapter 1: Data Center Driving Forces 10
The data center big picture 10
Inside the data center – Continuous Change 12
The Flat Data Center 13
Chapter 2: High-Speed Interconnects in Constant Transition 17
Chapter 2: High-Speed Interconnects in Constant Transition 18
Server speed drives the data center 18
Switches – Supporting faster and larger networks 19
New Switch ASICs are Supporting High-Radix 100GbE Networks 24
Powerful servers plus virtualized everything limits server growth 28
Data Center Topology and Cabling Varies 29
Hyperscale Data Centers: What we know 31
Cable Lengths in Data Centers 38
Chapter 3: Datacenter Optical “Speeds and Feeds” 45
It’s all about the SerDes; the per-lane speed 45
The “N x Z” Rate Paradigm 45
Ethernet Physical medium dependent (PMD) Variants 47
VCSELs at 25Gb/s, 50Gb/s and beyond 53
Chapter 4: Forecast 57
Data traffic growth in mega-datacenters 57
Forecast methodology 58
Market Forecast for Ethernet Transceivers 59
Market Forecast for 25G and 50G transceivers 67
Market Forecast for 40G transceivers 70
Market Forecast for 100G transceivers 72
Market Forecast for 200G and 400G transceivers 75

© Copyright 2020 LightCounting • www.lightcounting.com

Beyond 400GbE 81
APPENDIX 1: Ethernet Roadmap 84
The 2020 Ethernet Alliance Roadmap 84
Beyond 400G Ethernet 87
Multi-Source Agreements (MSAs) for Ethernet PMDs 91
Appendix 2: Form Factor MSA Madness 96
LightCounting view of form factor evolution 107
Two-in-One (2:1) Dual Modules: What and Why? 110
New Senko SN and US Conec MDC Connectors facilitate easy breakout applications 112
Appendix 3: Ethernet PMD Variants Described 115
25G Transceivers 115
40G Transceivers 115
50G Transceivers 120
100G Multimode Transceivers 121
Single-Mode Fiber 100G Transceivers 123
200G Transceivers 131
400G Transceivers 132
400G Single-Mode Transceivers 134
New 'Beyond 10K' Ethernet IEEE solutions 136
Appendix 4: Electrical Interfaces for Optical Modules 138
IEEE Attachment Unit Interfaces (New Nomenclature) 138
Optical Internetworking Forum Interface Agreements 140

Abstract

This report analyzes the impact of growing data traffic and the changing architecture of data centers on the market forecast for Ethernet optical transceivers with a focus on the high-speed modules used in data centers. It leverages extensive historical data on shipments of Ethernet modules combined with extensive market analyst research to make projections for sales of these products in 2020-2025. The report offers a comprehensive forecast for more than 50 product categories, including 10GbE, 25GbE, 40GbE, 100GbE, 200GbE, 2x200Gb, 400GbE and 2x400GbE transceivers, sorted by reach and form factors. It provides a summary of technical challenges faced by high-speed transceiver suppliers, including a review of the latest products and technologies introduced by leading suppliers.

The report is based on confidential sales information and on detailed analysis of publicly available data released by leading component and equipment manufacturers along with considerable input from industry experts.

LightCounting Market Research

858 West Park Street, Eugene, OR 97401

www.lightcounting.com

408-962-4851

LightCounting is a market research company focused on the in-depth study of high speed interconnects for the datacom, telecom, and consumer communications markets. Our research covers the whole supply chain from optical and semiconductor components, to modules, sub-systems and their applications in telecom and datacom systems.

Our industry reputation was built by providing solid market data and objective analysis to help industry executives in making tactical and strategic business decisions and see past all the market hype, rumors, press reports, blogs and other distortions that so often complicate and confuse many decision making processes.

This LightCounting market report contains material that is a confidential, privileged, company product for the sole use of the intended recipients being LightCounting clients and subscribers. Any review, reliance on or redistribution by others or forwarding without LightCounting's expressed permission is strictly prohibited.

For more information, go to: www.lightcounting.com

Or follow us on Twitter at: www.twitter.com/lightcounting