

**ElectroniCast Consultants**



## **FIBER OPTIC CONNECTOR & MECHANICAL SPLICE GLOBAL MARKET FORECAST (2010-2015)**

Published: October 17, 2011  
Fee: \$4,800  
Text Pages: 327 – PDF  
Excel File: Extensive market forecast database spreadsheets  
PowerPoint File: Data Figures  
Also Includes: 12-issues of the Fiber Optic Industry Monthly review

**Global Market Forecast Report** The global fiber optic connector/mechanical splice consumption is driven by a dramatic increase in bandwidth demand beyond the limits of copper. Technological advances in fiber optics are assuring the migration of fiber closer and closer to the end user. This translates into demand for shorter links where connectors represent a substantial share of the total installation cost. The cost concerns are being addressed with the introduction of smaller, lower cost and easier to install connectors. Multifiber connector (>2 fibers) use, still relatively small, will be the choice for high fiber density interconnects applications.

This report provides the Consumption Value (US\$, million), Quantity (number/units), and Average Selling Prices (ASP \$, each). The value is determined by multiplying the number of units by the average selling price. The ASPs are based on the price of the connector/splice at the initial factory level. This 2010-2015 market forecast is presented for each significant fiber optic connector and mechanical splice used in selected communication applications. The market data are segmented into the following geographic regions, plus a Global summary:

- America (North America, Central and South America)
- EMEA (Europe, Middle Eastern countries, plus Africa)
- APAC (Asia Pacific)

**The market forecast data are also built up from specific product-type segments:**

Single Mode Fiber Optic Connector

- ST Simplex
- FC Simplex
- SC Simplex
- Small Form Factor (SFF) Simplex Connector
  - SFF LC Simplex
  - SFF MU Simplex
  - SFF Other Simplex
- Single mode Adapter
  - In-series Adapter
  - Between-series Adapter
- Single mode Multi-channel/Multi-fiber Connector
  - MT Based
  - SFF Duplex Connector
    - SFF Duplex MT-RJ
    - SFF Other Duplex
  - Other Multi-fiber Connector
- Other Single mode Fiber Optic Connectors, including Mil-Spec

Multimode Fiber Optic Connectors

- ST Simplex
- SC Simplex
- Small Form Factor (SFF) Simplex Connector
  - SFF LC Simplex
  - SFF MU Simplex
  - SFF Other Simplex
- Adapter
  - In-series Adapter
  - Between-series Adapter
- Multi-channel/Multi-fiber Connector
  - ESCON
  - MT Based
  - FDDI
  - SFF Duplex Connector
    - SFF Duplex MT-RJ
    - SFF VF-45 Duplex
    - SFF Other Duplex
  - Other Multi-fiber Connector
- Other Multimode Fiber Optic Connectors, including Mil-Spec

Mechanical Splices

**The market forecast data are built up from specific end-user applications:**

Total Consumption  
Telecommunications  
Apparatus  
Utilities  
Modules/Components  
Private Data LAN/WAN  
Apparatus  
Modules/Components  
Cable TV  
Apparatus  
Modules/Components  
Military/Aerospace  
Specialty  
Non-production

**MPO Connectors in 40/100GbE** This report also provides the ElectroniCast forecast of North American consumption trends of MPO fiber optic connectors specifically in 40/100 Gigabit Ethernet (GbE) networks, based on the IEEE standard, which was ratified on June 17, 2010. This 2010-2015 MPO 40/100GbE forecast of North American consumption is presented for each of the following data rate, connector fiber count and media type:

40G Ethernet Network - MPO

12-fiber Multimode Connector  
24-fiber Multimode Connector  
12-fiber Single mode Connector  
24-fiber Single mode Connector

100G Ethernet Network - MPO

12-fiber Multimode Connector  
24-fiber Multimode Connector  
12-fiber Single mode Connector  
24-fiber Single mode Connector

The market data is detailed by the following Functions:

- Consumption (use) Value (US\$, Million)
- Quantity/Volume (Thousand/Units)
- Average Selling Price (ASP – US\$, Each)

**Fiber Optic Industry Monthly Reviews** In addition to the main report, this service includes the Fiber Optic Industry Monthly Reviews. The monthly report provide summaries from recent ElectroniCast market/technology analysis, as well as several industry news items of interest...

**Monthly Reviews - Typical Outline:**

- ElectroniCast – Fiber Optic Oriented Market and Technology Overview (5-8 pages)
- ElectroniCast – Fiber Optic Oriented Market and Technology Overview (5-8 pages)
- Fiber Optic Industry News (10-15 pages)
  - Venture Capital or Financial News
  - New Products
  - Fiber Optic Deployment/Installations
  - Technology News

**About ElectroniCast** ElectroniCast Consultants specializes in forecasting trends in communication networks and in the products used in those networks. This includes technology forecasting, markets and applications forecasting, strategic planning and consulting. ElectroniCast Consultants, as a technology-based independent forecasting firm, serves industrial companies, trade associations, government agencies, communication and data network companies and the financial community. Reduction of the risk of major investment decisions is the main benefit provided. ElectroniCast's goal is to understand the challenges and opportunities facing clients and to provide timely, accurate information for strategic planning.

**Director of Study** Stephen Montgomery, MBA/Technology Management, President – International Business Expansion at ElectroniCast Consultants. He has specialized in photonics and fiber optic components market & technology forecasting at ElectroniCast for over 20-years. He has given numerous presentations and published a number of articles on optical communication markets, technology, applications and installations. He is a member of the Editorial Advisory Board of LIGHTWAVE magazine (PennWell Publishing) and writes a monthly article covering the optical communication industry for OPTCOM Magazine in Japan (Kogyo Tsushin Co., Ltd.).

## Table of Contents

1.	Executive Summary	1-1
1.1	Fiber Optic Connectors/ Mechanical Splice Overview	1-1
1.2	Use of Fiber Optics in Harsh Environments	1-10
1.3	Fiber Optic Networks – Overview	1-19
1.4	Fiber Optics Industry: Decade-to-Decade	1-61
1.5	Optical Communication Trends	1-69
1.5.1	Fiber Network Technology Trends	1-69
1.5.2	Components	1-77
1.5.2.1	Overview	1-77
1.5.2.2	Transmitters and Receivers	1-79
1.5.2.3	Optical Amplifiers	1-80
1.5.2.4	Dispersion Compensators	1-81
1.5.2.5	Fiber Cable	1-82
1.5.3	Devices and Parts	1-83
1.5.3.1	Overview	1-83
1.5.3.2	Emitters and Detectors	1-85
1.5.3.3	VCSEL & Transceiver Technology Review	1-86
1.5.3.4	Optoelectronic Application-Specific Integrated Circuits (ASICs)	1-86
1.5.3.5	Modulators	1-94
1.5.3.6	Packages	1-98
1.5.3.7	Optoelectronic Integrated Circuits	1-98
2	Fiber Optic Connector/Mechanical Splice	2-1
2.1	Global Market Overview	2-1
2.2	The Americas: Connector/Mechanical Splice	2-43
2.2.1	American Market Forecast, by Type	2-43
2.2.2	American Market Forecast, by Application	2-48
2.3	EMEA: Connector/Mechanical Splice	2-55
2.3.1	EMEA Market Forecast, by Type	2-55
2.3.2	EMEA Market Forecast, by Application	2-59
2.4	APAC: Connector/Mechanical Splice	2-67
2.4.1	APAC Market Forecast, by Type	2-67
2.4.2	APAC Market Forecast, by Application	2-71
3.	40/100G Ethernet Networks – MPO Connectors	3-1
3.1	North America Market Forecast and Analysis	3-1
3.2	40/100G Ethernet Networks – MPO Connectors Standard Analysis	3-12
3.3	40/100G Ethernet Networks – MPO Connectors Application Analysis	3-21
3.4	40/100G Ethernet Networks – MPO Connectors Fiber Optic Cable/Transceiver Interface Analysis	3-31
4.	Competitive Market Share and List of Selected Vendors	4-1
5.	Methodology	5-1
5.1	Research and Analysis Methodology	5-1
5.2	Assumptions of Fiber Optic Component Global Market Forecast	5-4
6.	Definitions: Acronyms, Abbreviations, and General Terms	6-1
7.	Market Forecast Data Base; Overview and Tutorial	7-1
Addendum	<a href="#">Market Forecast Data Base – Excel Spreadsheets</a> Americas, EMEA, APAC, Global Summary, plus North America 40/100GbE – MPO Connectors	
Addendum	<a href="#">PowerPoint Slides (Data Figures)</a>	

## List of Tables

1.1.1	Global Fiber Optic Connector/Splice Consumption Forecast, by Region (\$, Million)	1-1
1.1.2	Fiber Optic Connector Application Category List	1-4
1.1.3	Fiber Optic Connector Category List	1-5
1.1.4	Fiber Optic Connector/Splice Global Consumption Forecast, by Type (\$, Million)	1-7
1.1.5	Fiber Optic Connector/Splice Global Consumption Forecast, by Application (\$, Million)	1-8
1.3.1	Minimum & Ideal Speeds Necessary for Popular Applications	1-26
2.1.1	Fiber Optic Connector Application Category List	2-6
2.1.2	Fiber Optic Connector Category List	2-7
2.1.3	Global Fiber Optic Connector/Splice Consumption Value, by Region (US\$, Million)	2-30
2.1.4	Global Fiber Optic Connector/Splice Consumption, by Region (Quantity Basis)	2-31
2.1.5	Fiber Optic Connector/Splice Global Consumption, by Type (Value Basis, \$ Million)	2-32
2.1.6	Fiber Optic Connector/Splice Global Consumption, by Type (Quantity Basis)	2-33
2.1.7	Fiber Optic Connector/Splice Global Consumption, by Type (Average Selling Price, \$/Each)	2-34
2.1.8	Singlemode Fiber Optic Connector Global Consumption, by Type (\$ Million)	2-35
2.1.9	Fiber Optic Multimode Connector Global Consumption, by Type (\$ Million)	2-36
2.1.9	Selected Standards For Fiber Optic Connectors	2-38 to 2-39
2.1.10	Fiber Optic Connector/Splice Global Consumption, by Application (\$ Million)	2-41
2.1.11	Fiber Optic Connector/Splice Global Consumption, by Application (Quantity Basis)	2-42
2.1.12	Fiber Optic Connector/Splice Global Consumption, by Application (Average Price, \$/Each)	2-42
2.2.1.1	Fiber Optic Connector/Splice American Consumption, by Type (\$ Million)	2-44
2.2.1.2	Fiber Optic Connector/Splice American Consumption, by Type (Quantity Basis)	2-44
2.2.1.3	Singlemode Fiber Optic Connector American Consumption, by Type (\$ Million)	2-46
2.2.1.4	Fiber Optic Multimode Connector American Consumption, by Type (\$ Million)	2-47
2.2.2.1	Fiber Optic Connector/Splice American Consumption, by Application (\$ Million)	2-49
2.2.2.2	Fiber Optic Connector/Splice American Consumption, by Application (Quantity Basis)	2-49
2.2.2.3	Singlemode Connector American Market Forecast, by Application (\$Million)	2-50
2.2.2.4	Singlemode Connector American Market Forecast, by Application (Quantity Basis)	2-50
2.2.2.5	Multimode Connector American Market Forecast, by Application (\$ Million)	2-52
2.2.2.6	Multimode Connector American Market Forecast, by Application (Quantity Basis)	2-52
2.2.2.7	Fiber Optic Mechanical Splice American Forecast, by Application (\$ Million)	2-53
2.2.2.8	Fiber Optic Mechanical Splice American Forecast, by Application (Quantity Basis)	2-54
2.3.1.1	Fiber Optic Connector/Splice EMEA Consumption, by Type (\$ Million)	2-55
2.3.1.2	Fiber Optic Connector/Splice EMEA Consumption, by Type (Quantity Basis)	2-56
2.3.1.3	Singlemode Fiber Optic Connector EMEA Consumption, by Type (\$ Million)	2-57
2.3.1.4	Multimode Fiber Optic Connector EMEA Consumption, by Type (\$ Million)	2-58
2.3.2.1	Fiber Optic Connector/Splice EMEA Consumption, by Application (\$ Million)	2-61
2.3.2.2	Fiber Optic Connector/Splice EMEA Consumption, by Application (Quantity Basis)	2-61
2.3.2.3	Singlemode Connector EMEA Market Forecast, by Application (\$Million)	2-62
2.3.2.4	Singlemode Connector EMEA Market Forecast, by Application (Quantity Basis)	2-63
2.3.2.5	Multimode Connector EMEA Market Forecast, by Application (\$ Million)	2-64
2.3.2.6	Multimode Connector EMEA Market Forecast, by Application (Quantity Basis)	2-65
2.3.2.7	Fiber Optic Mechanical Splice EMEA Forecast, by Application (\$ Million)	2-66
2.3.2.8	Fiber Optic Mechanical Splice EMEA Forecast, by Application (Quantity Basis)	2-66
2.4.1.1	Fiber Optic Connector/Splice APAC Consumption, by Type (\$ Million)	2-67
2.4.1.2	Fiber Optic Connector/Splice APAC Consumption, by Type (Quantity Basis)	2-68
2.4.1.3	Singlemode Fiber Optic Connector APAC Consumption, by Type (\$ Million)	2-69
2.4.1.4	Multimode Fiber Optic Connector APAC Consumption, by Type (\$ Million)	2-70
2.4.2.1	Fiber Optic Connector/Splice APAC Consumption, by Application (\$ Million)	2-76
2.4.2.2	Fiber Optic Connector/Splice APAC Consumption, by Application (Quantity Basis)	2-76
2.4.2.3	Singlemode Connector APAC Market Forecast, by Application (\$Million)	2-77
2.4.2.4	Singlemode Connector APAC Market Forecast, by Application (Quantity Basis)	2-77
2.4.2.5	Multimode Connector APAC Market Forecast, by Application (\$ Million)	2-78
2.4.2.6	Multimode Connector APAC Market Forecast, by Application (Quantity Basis)	2-79
2.4.2.7	Fiber Optic Mechanical Splice APAC Forecast, by Application (\$ Million)	2-80
2.4.2.8	Fiber Optic Mechanical Splice APAC Forecast, by Application (Quantity Basis)	2-80
3.1.1	40/100GbE (Total) MPO Connectors North America Consumption (Value Basis, \$ Million)	3-3
3.1.2	40/100GbE (Total) MPO Connectors North America Consumption (Quantity, Unit/Thousand)	3-4
3.1.3	40/100GbE (Total) MPO Connectors North America Consumption (Average Price, \$ Each)	3-5

3.1.4	40GbE MPO Connectors North America Consumption (Value Basis, \$ Million)	3-7
3.1.5	40GbE MPO Connectors North America Consumption (Quantity Basis, Unit/Thousand)	3-8
3.1.6	40GbE MPO Connectors North America Consumption (Average Selling Price, \$ Each)	3-8
3.1.7	100GbE MPO Connectors North America Consumption (Value Basis, \$ Million)	3-10
3.1.8	100GbE MPO Connectors North America Consumption (Quantity Basis, Unit/Thousand)	3-11
3.1.9	100GbE MPO Connectors North America Consumption (Average Selling Price, \$ Each)	3-11
3.2.1	IEEE 802.3ae and 802.3ba Standard: OM3- and OM4-Specified Distances for Ethernet	3-13
3.2.2	IEEE 802.3ba 40G/100G - Physical Layer Specifications	3-15
3.4.1	40/100GbE Transceiver Form Factor, by Media, Speed, Distance, by Generation 1 and 2	3-32
3.4.2	OM Cable – Fiber Cable Specifications	3-47
4.2.1	Selected Global Fiber Optic Connector and Other Assembly Suppliers	4-3 to 4-6
4.2.1	Fiber Optic Connector/Mechanical Splice Global Market Share Estimates, 2010)	4-7
7.1.1	Fiber Optic Connector/Mechanical Splice Product Categories	7-2
7.1.2	Fiber Optic Connector/Mechanical Splice Application Categories	7-3

## List of Figures

1.1.1		
1.1.2	Global Fiber Optic Connector/Splice Value Forecast, by Region (\$, Million)	1-2
1.1.3	Global Fiber Optic Connector/Splice Value Forecast, by Type (\$, Million)	1-7
1.1.4	Global Fiber Optic Connector/Splice Value Forecast, by Application (\$, Million)	1-9
1.3.1	North America Multi-protocol Label Switching (MPLS)	1-34
1.3.2	North America Internet Access	1-35
1.3.3	FTTP PON Architecture	1-36
1.3.4	Next-Generation Wholesale Broadband Network	1-40
1.4.1	Evolution of Research Emphasis during Technology Life Cycle	1-68
1.5.3.3.1	Genealogy of VCSELs	1-87
1.5.3.3.2	Typical Intra-Office Interconnections	1-91
1.5.3.7.1	Trend of Transceiver Packaging Density, Gigabits/Cubic Inch	1-104
2.1.1	Fiber Distribution Hub	2-2
2.1.2	Fiber Distribution Hub	2-3
2.1.3	Fiber Distribution Terminal	2-4
2.1.4	Selected Fiber Optic Connectors	2-8 to 2-14
2.1.5	The LC Uniboot	2-15
2.1.6	4X Optical Connector	2-16
2.1.7	40-Gigabit optical active Cable (OAC)	2-18
2.1.8	Quad Small Form-factor Pluggable (QSFP) MSA Solution	2-19
2.1.9	Ruggedized fiber-optic connector system	2-21
2.1.10	Dry Cloth Cleaner	2-23
2.1.11	Cleaners for Single Fiber Connections	2-24
2.1.12	Pre-Polished Field Installable Connectors	2-26
2.1.13	SC Connector - Field Installable Connectors	2-27
2.1.14	Connector Sales/Distribution Product Flow	2-29
3.4.1	CFP, CXP and QSFP Form Factors	3-33
3.4.2	CFP Parallel Optical Module (100GBASE-SR10)	3-35
3.4.3	4-Channel Pluggable QSFP + Transceiver for 40GBASE-SR4 applications	3-37
3.4.4	Pre-Terminated MTP with Cable and Panel	3-40
3.4.5	MPO female / MPO female OM3 multimode 12F – Ribbon cable 10m	3-41
3.4.6	Schematic of MPO connector/single fiber connector(s) “Fan-Out”	3-43
3.4.7	10x10Gb/s Parallel Optics and MPO Connector	3-44
5.1.1	Market Research & Forecasting Methodology	5-4