

# Multimode Fiber Standards Overview

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# Multimode Fiber Standards Overview

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- Standards – 10,000 ft view
- Fiber Specifications
- Applications Standards
- Future of MMF

# Standards

## A 10,000 ft View

**TIA FO-4**, Fiber Optic Test Methods and Specifications  
(North America – Steve Swanson, Chair)

**IEC TC 86**, Fiber Optic Test Methods and Specifications  
(International – Umberto Rossi, Chair)

*Basic  
Spec.  
Doc.s*

**TIA 492** Series of Fiber Specifications

**TIA 455** Series of Fiber Optic Test Procedures

**IEC 60793-2** Series of Fiber Specifications

**IEC 60793-1** Series of Fiber and Cable Test Methods

(Subordinate  
specifications)

**TIA 568B** Structured Cabling Standard (North America)

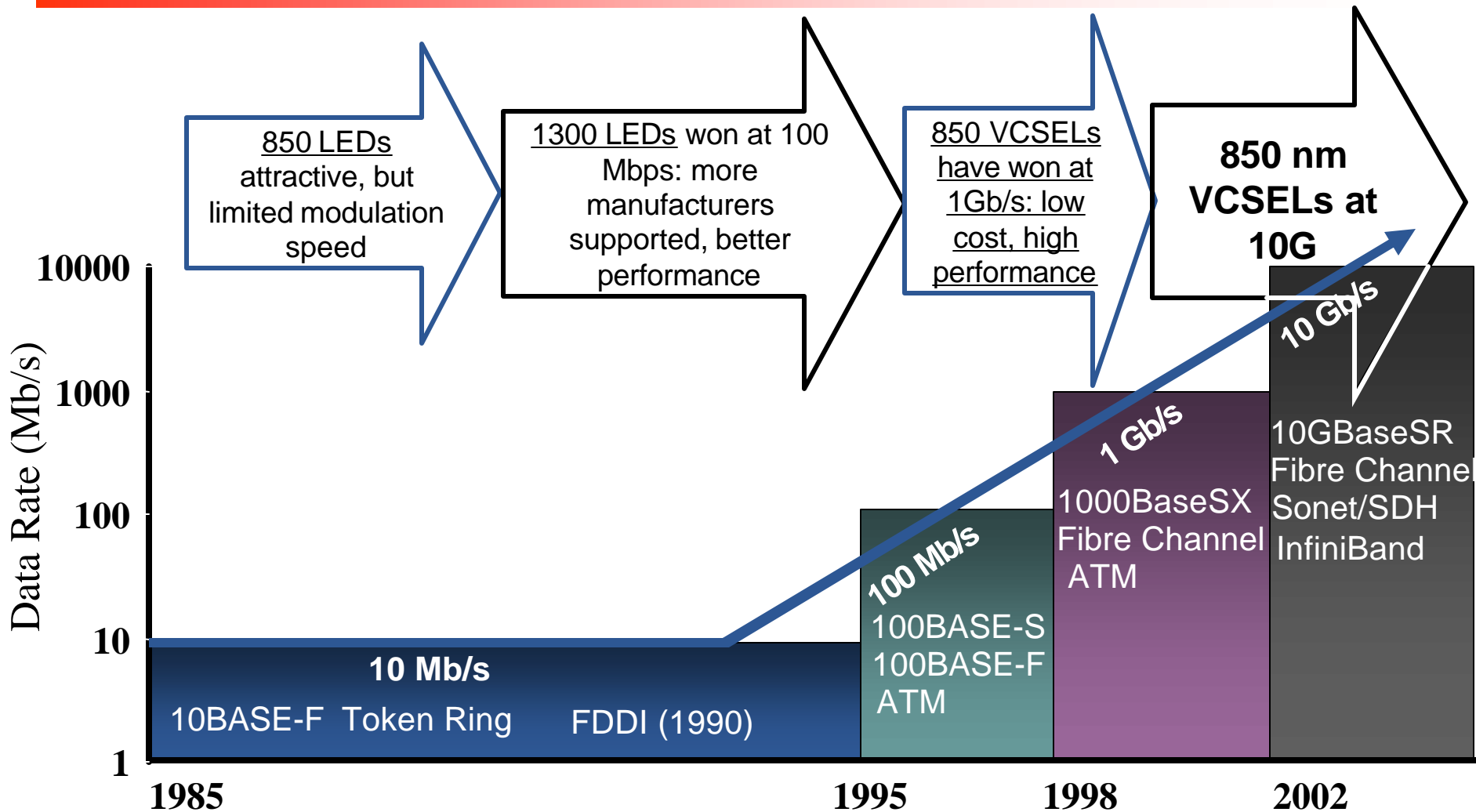
(Referenced by) **ISO/IEC 11801** Structured Cabling Standard (International)

Which are then referenced by various Application Standards, including Ethernet, Fibre Channel, Optical Internetworking Forum (OIF Standards), etc...

# Multimode Fiber Specifications Describe Legacy and Laser-Optimized Fiber Types

Standards Body	Document	Notes
TIA – Telecommunications Industry Association	492AAA	62.5 μm fibers with 160/500 MHz.km OFL BW
	492AAAB	50 μm fibers with 500/500 MHz.km OFL BW
	492AAAC	Laser-optimized 50 μm fibers with 2000 MHz.km EMB at 850 nm
IEC – International Electrotechnical Commission	60793-2-10	A1a.1 fiber – 50 μm fibers with a range of OFL BW
		A1a.2 fiber – Laser-optimized 50 μm fibers with 2000 MHz.km EMB at 850 nm
		A1b fiber – 62.5 μm fibers with a range of OFL BW
ISO – International Standards Organization	11801	OM1 fiber – 200/500 MHz.km OFL BW (in practice OM1 fibers are 62.5 μm fibers)
		OM2 fiber – 500/500 MHz.km OFL BW (in practice OM2 fibers are 50 μm fibers)
		OM3 fiber – Laser-optimized 50 μm fibers with 2000 MHz.km EMB at 850 nm

# Application Standards Have Evolved to Meet High-Performance Premises Requirements



# Application Standard Examples

Fiber Type Wavelength Modal Bandwidth (MHz.km)				Link Length (meters)					
				50/125			62.5/125		
				850 nm		1300 nm	850 nm		1300 nm
Application Standard	Nom Speed (Mb/sec)	Baud Rate (Mb/sec)	Light Source	500	2000	500	160	200	500
<b>IEEE 802.3 series Ethernet</b>									
1000BASE-SX	1,000	1250	850 nm VCSEL	550	860	-	220	275	-
1000BASE-LX	1,000	1250	1310 nm FP	-	-	550	-	-	550
10GBASE-SR	10,000	10312.5	850 nm VCSEL	82	300	-	26	33	-
10GBASE-LX4	10,000	4 x 3125	1310 nm DFB	-	-	300	-	-	300
<b>ANSI - INCITS Fibre Channel</b>									
100-M5/6-SN-I	1,000	1062.5	850 nm VCSEL	500	860	-	250	300	-
200-M5/6-SN-I	2,000	2125	850 nm VCSEL	300	500	-	120	150	-
400-M5/6-SN-I	4,000	4250	850 nm VCSEL	150	270	-	55	70	-
1200-M5/6E-SNS	10,000	10500	850 nm VCSEL	82	300	-	26	33	-
1200-M5/6-SN4S	10,000	4 x 3125	850 nm VCSEL	290	550	-	-	118	-
1200-M5/6-LC4S	10,000	4 x 3125	1300 nm DFB	-	-	290	-	-	290
<b>ITU/T - SONET/SDH OIF VSR</b>									
OC-192 VSR4-01	10,000	12 x 1250	850 nm VCSEL	550	850	-	220	275	-
OC-192 VSR4-02	10,000	1 x 9953	1310 nm FP/DFB	-	-	-	-	-	-
OC-192 VSR4-03	10,000	4 x 2488	850 nm VCSEL	300	620	-	-	-	-
OC-192 VSR4-04	10,000	1 x 9953	850 nm VCSEL	85	300	-	25	33	-
OC-768 VSR5-01	40,000	12 x 3318	850 nm VCSEL	100	300	-	-	-	-

# The Future of Multimode Fiber

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- Scalability
  - Extended link lengths at 10 Gb/s
  - 40 Gb/s data rates via CWDM
- Parallel optics
  - Ribbon cables
  - Array VCSELs