

FIA
The Fibreoptic Industry Association

THE CHALLENGE OF THE NEW OPTICAL FIBRE TECHNOLOGIES

17th September 2002
Botanical Gardens
Birmingham

The Way We Were
1GbE and 10GbE
OF Categories
Channel Design
Cleaning
SFF Connecting Hardware
Testing
FIA Support Documentation

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The Challenge of the New Optical Fibre Technologies

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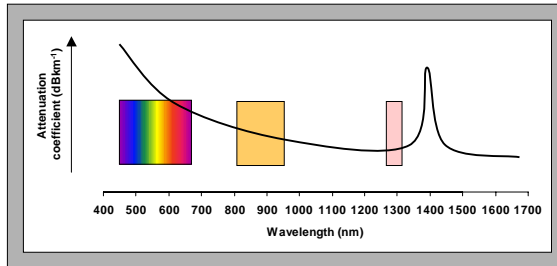
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The Way We Were



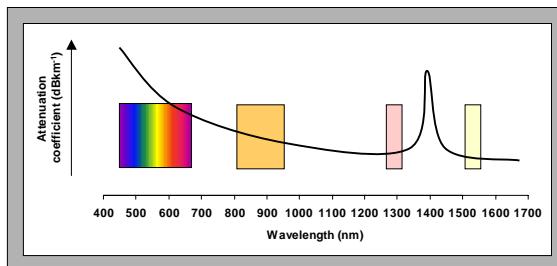
Mbs ⁻¹	Network name	62.5/125		50/125	
		OPB (dB)	L _{max} (m)	OPB (dB)	L _{max} (m)
	850 nm MMF				
10	ISO/IEC 8802-3: 10BASE-FL/FB	12.5	2000	6.8	1514
4/16	ISO/IEC TR 11802-4: 4 & 16 Mb/s Token Ring	13.0	2000	8.0	1857
	1300 nm MMF				
100	ISO/IEC 9314-3: FDDI PMD	11.0	2000	6.0	2000
100	ISO/IEC 8802-3: 100BASE-FX	11.0	2000	5.3	2000

62.5/125 seems to offer an advantage



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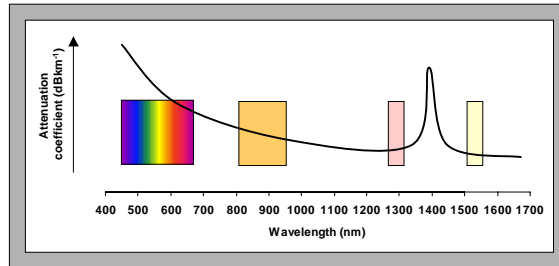
1 GbE Technologies



	850nm		1300nm		1310nm
	62.5/125	50/125	62.5/125	50/125	SMF
OFL Modal Bandwidth (MHz.km)	200	500	500	500	
Assumed OF attenuation (dBkm ⁻¹)	3.75	3.50	1.5	1.5	0.5
1000BASE	-SX		-LX		
	830nm		1270nm	1270nm	
Maximum channel length (m)	275	550	550	550	5000
Max. OF cable attenuation (dB)	1.1	2.06	0.85	0.85	2.57
Connecting hardware allowance (dB)	1.5	1.5	1.5	1.5	2.0
Maximum Channel Insertion Loss (dB)	2.60	3.56	2.35	2.35	4.57



10 GbE Technologies



	850nm	1300nm	1310nm	1550nm
	62.5/125	50/125	MMF	SMF
OFL Modal Bandwidth (MHz.km)	200	500	500	
Assumed OF attenuation (dBkm ⁻¹)	3.50	3.50	1.5	0.4
10GBASE	-SR/SW	-LX4	-LR/LW	-LX4
	830nm	1269-1356 nm	1270nm	1269-1356 nm
Maximum channel length (m)	33	82	300	10000
Max. OF cable attenuation (dB)	0.12	0.30	0.46	4.20
Connecting hardware allowance (dB)	1.5	1.5	1.5	2
Maximum Channel Insertion Loss (dB)	1.62	1.80	2.46	6.20



Optical Fibre Cable Categories

IT CABLING STANDARDS	
ISO/IEC 11801 Ed. 2 (2002) (to be published Q3, 2002)	EN 50173 Ed. 2 (2002) (to be published Q3, 2002)

	Multimode OF			Singlemode OF		
	Wavelength	50/125 or 62.5/125	50/125	Wavelength	OS1	
Attenuation coefficient (max)	850nm	3.5 dBkm ⁻¹	OM2	1310nm	1,0	
	1300nm	1,5 dBkm ⁻¹	OM3	1550nm	1,0	
Modal bandwidth OFL (MHz.km min)	850nm	200	500	1500		
	1300nm	500	500	500		
Modal bandwidth LL (MHz.km min)	850nm	-	-	2000		
	1300nm	-	-	-		
Propagation delay (ns.m ⁻¹ max)	850nm	5			1310nm	5
	1300nm	5			1550nm	5

Legacy OF Legacy OF

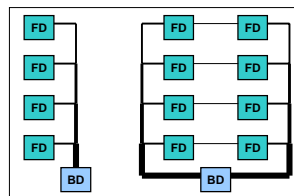
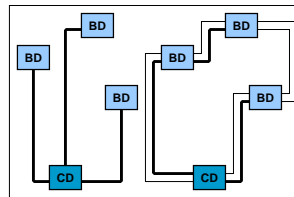


OM3 and 10GBASE-SR/SW

	62.5/125	50/125	50/125
	850nm		
	OM1	OM2	OM3
OFL Modal Bandwidth (MHz.km)	200	500	500
Assumed OF attenuation (dBkm ⁻¹)	3.50	3.50	3.50
	-SR/SW		
	830nm		
10GBASE			
Maximum channel length (m)	33	82	300
Max. OF cable attenuation (dB)	0.12	0.30	1.09
Connecting hardware allowance (dB)	1.5	1.5	1.5
Maximum Channel Insertion Loss (dB)	1.62	1.80	2.59

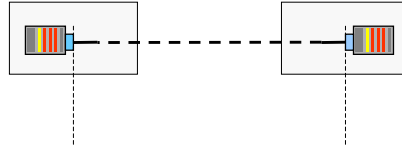


“Mission-Critical” Infrastructures





Component Length Equivalence

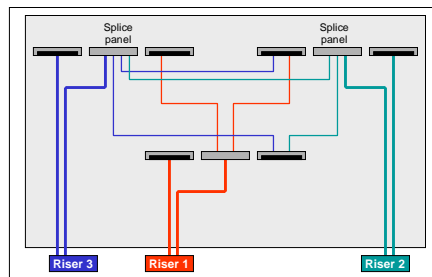


MMF COMPONENT EQUIVALENCE		
	@ 850nm	@ 1300nm
Cable	3.5 dBkm ⁻¹	1.5 dBkm ⁻¹
Connector	0.75 dB	0.75 dB
	214 m	500 m
Splice	0.30 dB	0.30 dB
	86 m	200 m

SMF COMPONENT EQUIVALENCE		
	@ 1310nm	@ 1550nm
Cable	1.0 dBkm ⁻¹	0.5 dBkm ⁻¹
Connector	0.75 dB	0.75 dB
	750 m	1500 m
Splice	0.30 dB	0.30 dB
	300 m	600 m



Creative Diversity



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Cleaning

The diagram illustrates the impact of contamination on a 50 µm Multimode Fibre (MMF). It shows a clean connector end-face with labels for 'Epoxy adhesive', 'Core', and 'Cladding'. A second diagram shows the same end-face with 'Contamination radius r_1 ' and 'Contamination radius r_2 '. Below this is a graph of Loss (dB) versus Total contamination radius (microns). The graph shows a curve starting at 0 dB for 0 microns and rising to approximately 4.5 dB at 20 microns. A specific point is marked at 142 m @ 850 nm, corresponding to a total contamination radius of about 8 microns and a loss of approximately 0.5 dB.

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Testing

ARENA	REFERENCE	TITLE
IEC	61280-4-1	Fibre optic communication subsystem basic test procedures - Part 4-1: Fibre optic cable plant - Multimode fibre optic cable plant
IEC	61280-4-2	Fibre optic communication subsystem basic test procedures - Part 4-2: Fibre optic cable plant - Single-mode fibre optic cable plant
EN	50346	Information Technology - Testing of installed cabling
TIA/EIA	526-14-A	OFSTP-14A Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant (ANSI/TIA/EIA-526-14A-98)
TIA/EIA	526-7	OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant (ANSI/TIA/EIA-526-7-98)

LSPM = Light Source - Power Meter

Light Source


Connector independent of cabling under test

Power Meter

Connector dependent on cabling under test
• interchangeable

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FIA Technical Support Documents

FIA	
THE FIBREOPTIC INDUSTRY ASSOCIATION www.fibreoptic.org.uk	
DESIGN	
2000-1-1	OPTICAL FIBRE CABLING: LAN APPLICATION SUPPORT GUIDE
2000-1-3	OPTICAL FIBRE CABLING: DARK FIBRE SUPPORT GUIDE
OPERATION	
2000-3-3	POLARITY MAINTENANCE
INSTALLATION	
2000-4-2-1	TESTING OF INSTALLED CABLING: ATTENUATION USING LSPM EQUIPMENT
2000-4-2-2	TESTING OF INSTALLED CABLING: ATTENUATION USING OTDR EQUIPMENT
SAFETY	
2000-5-1	OPTICAL POWER: SAFETY LEVELS
2000-5-2	OPTICAL FIBRE: HANDLING OF PROCESSING CHEMICALS
2000-5-3	OPTICAL FIBRE: DISPOSAL OF WASTE
MODELLING TOOLS	
CABLING STRUCTURES COST MODEL	



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Thank you for your time



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