

Fibre Selection Guide

Introduction:

The aim of this “Fibre Selection Guide” is to give you the tools to select the right fibre depending on your application (Active equipment and cable length). We have analysed 3 applications (Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet) and compared their respective system costs depending on the fibre type and the cable length.

You will find too at the end of this guide, all technical information concerning optical and geometrical parameters.

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- Fast Ethernet transmission
- Gigabit Ethernet transmission
- 10 Gigabit Ethernet transmission
- Max. cable length versus application and fibre type
- Optical parameters of different fibre types
- Geometrical parameters of different fibre types

Fibre Selection Guide

Fast Ethernet (100 Mb/s)

The following price comparison is based on following parameters:

- 8 fibre cable
- 16 connectors
- 8 LEDs (@ 850 nm & 1300 nm)
- Connector assembly cost
- Installation cost

Price comparison between the different fibre types related to installed cable length.

Basis : Factor 100 = Fast Ethernet with a MM62.5 GIGAlite, installed length : 25 m

Length	Wavelength 850 nm			
	MM62.5 * GIGAlite	MM62.5 * GIGAlite II	MM50 GIGAlite	MM50 GIGAlite II
25 m	100,0	101,2	98,3	100,4
50 m	114,5	116,8	111,1	115,3
75 m	128,9	132,5	123,9	130,2
100 m	143,4	148,1	136,6	145,1
125 m	157,8	163,8	149,4	159,9
150 m	172,3	179,4	162,2	174,8
175 m	186,7	195,1	174,9	189,7
200 m	201,2	210,7	187,7	204,6
225 m	215,6	226,3	200,5	219,5
250 m	230,1	242,0	213,3	234,3
275 m	244,5	257,6	226,0	249,2
300 m	259,0	273,3	238,8	264,1
350 m				
400 m				
450 m				
500 m				
550 m				
600 m				
650 m				
700 m				
750 m				
800 m				
900 m				
1000 m				
1100 m				
1200 m				
1400 m				
1600 m				
1800 m				
2000 m				

Length	Wavelength 1300 nm			
	MM62.5 * GIGAlite	MM62.5 * GIGAlite II	MM50 GIGAlite	MM50 GIGAlite II
25 m	130,6	131,7	128,9	131,0
50 m	145,0	147,4	141,6	145,9
75 m	159,5	163,0	154,4	160,7
100 m	173,9	178,7	167,2	175,6
125 m	188,4	194,3	180,0	190,5
150 m	202,8	210,0	192,7	205,4
175 m	217,3	225,6	205,5	220,3
200 m	231,7	241,2	218,3	235,1
225 m	246,2	256,9	231,0	250,0
250 m	260,6	272,5	243,8	264,9
275 m	275,1	288,2	256,6	279,8
300 m	289,5	303,8	269,4	294,7
350 m	318,4	335,1	294,9	324,4
400 m	347,3	366,4	320,4	354,2
450 m	376,2	397,7	346,0	383,9
500 m	405,1	429,0	371,5	413,7
550 m	434,0	460,3	397,1	443,4
600 m	462,9	491,5	422,6	473,2
650 m	491,8	522,8	448,2	503,0
700 m	520,7	554,1	473,7	532,7
750 m	549,6	585,4	499,2	562,5
800 m	578,6	616,7	524,8	592,2
900 m	636,4	679,3	575,9	651,8
1000 m	694,2	741,8	626,9	711,3
1100 m	752,0	804,4	678,0	770,8
1200 m	809,8	867,0	729,1	830,3
1400 m	925,4	992,1	831,3	949,3
1600 m	1041,0	1117,3	933,5	1068,4
1800 m	1156,6	1242,4	1035,6	1187,4
2000 m	1272,2	1367,6	1137,8	1306,4

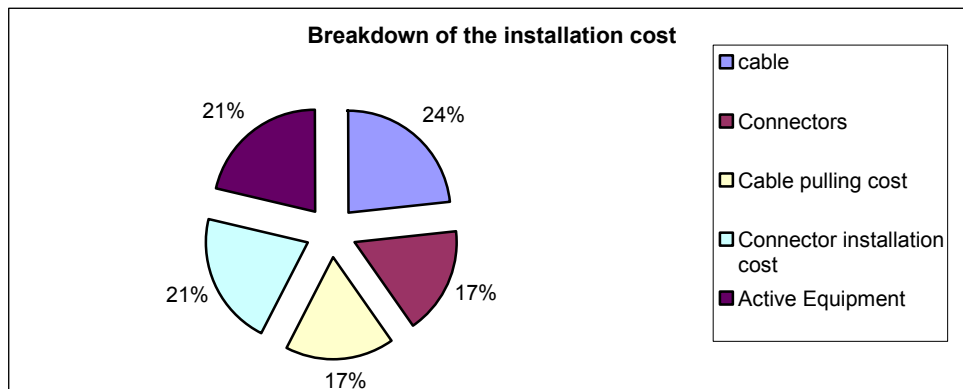
*

in bold

Maintenance cost of MM62.5 is lower than MM50.

Recommended fibre

Example (Fast Ethernet transmission with a *GIGAlite* MM62.5 fibre @ 850 nm):



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1 Gigabit Ethernet (IEEE802.3z)

The following price comparison is based on following parameters:

- 8 fibre cable
- 16 connectors
- 8 GBICs (VCSEL @ 850 nm & LASER @ 1300 nm)
- Connector assembly cost
- Installation cost

Price comparison between the different fibre types related to installed cable length.

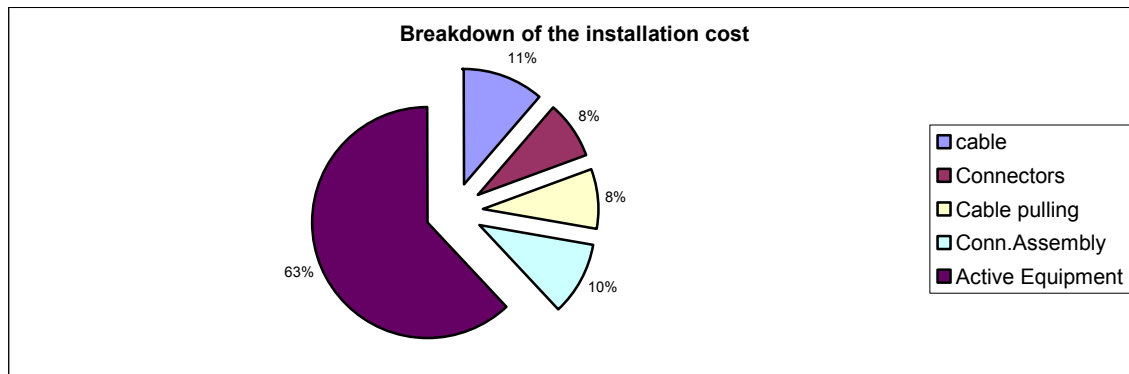
Basis : Factor 100 = **Fast Ethernet** with a MM62.5 GIGAlite, installed length : 25 m

	Wavelength 850 nm					
	MM62.5 GIGAlite *	MM62.5 GIGAlite II *	MM50 GIGAlite	MM50 GIGAlite II	MM50 GIGAlite 3	MM50 GIGAlite 4
Length						
25 m	206,83	207,80	205,45	207,18	212,25	217,50
50 m	218,65	220,60	215,90	219,35	229,50	240,00
75 m	230,48	233,40	226,35	231,53	246,75	262,50
100 m	242,30	246,20	236,80	243,70	264,00	285,00
125 m	254,13	259,00	247,25	255,88	281,25	307,50
150 m	265,95	271,80	257,70	268,05	298,50	330,00
175 m	277,78	284,60	268,15	280,23	315,75	352,50
200 m	289,60	297,40	278,60	292,40	333,00	375,00
225 m	301,43	310,20	289,05	304,58	350,25	397,50
250 m	313,25	323,00	299,50	316,75	367,50	420,00
275 m	325,08	335,80	309,95	328,93	384,75	442,50
300 m		348,60	320,40	341,10	402,00	465,00
350 m		374,20	341,30	365,45	436,50	510,00
400 m		399,80	362,20	389,80	471,00	555,00
450 m		425,40	383,10	414,15	505,50	600,00
500 m		451,00	404,00	438,50	540,00	645,00
550 m		476,60	424,90	462,85	574,50	690,00
600 m		502,20		487,20	609,00	735,00
650 m				511,55	643,50	780,00
700 m				535,90	678,00	825,00
750 m				560,25	712,50	870,00
800 m				584,60	747,00	915,00
900 m						
1000 m						
1100 m						
1200 m						
1400 m						
1600 m						
1800 m						
2000 m						

	Wavelength 1300 nm				
	MM62.5 GIGAlite *	MM62.5 GIGAlite II *	MM50 GIGAlite	MM50 GIGAlite II	SM
Length					
25 m	506,8	507,8	505,5	507,2	523,5
50 m	518,7	520,6	515,9	519,4	531,9
75 m	530,5	533,4	526,4	531,5	540,4
100 m	542,3	546,2	536,8	543,7	548,8
125 m	554,1	559,0	547,3	555,9	557,3
150 m	566,0	571,8	557,7	568,1	565,7
175 m	577,8	584,6	568,2	580,2	574,2
200 m	589,6	597,4	578,6	592,4	582,6
225 m	601,4	610,2	589,1	604,6	591,1
250 m	613,3	623,0	599,5	616,8	599,5
275 m	625,1	635,8	610,0	628,9	608,0
300 m	636,9	648,6	620,4	641,1	616,4
350 m	660,6	674,2	641,3	665,5	633,3
400 m	684,2	699,8	662,2	689,8	650,2
450 m	707,9	725,4	683,1	714,2	667,1
500 m	731,5	751,0	704,0	738,5	684,0
550 m	755,2	776,6	724,9	762,9	700,9
600 m		802,2		787,2	717,8
650 m		827,8		811,6	734,7
700 m		853,4		835,9	751,6
750 m		879,0		860,3	768,5
800 m		904,6		884,6	785,4
900 m		955,8		933,3	819,2
1000 m		1007,0		982,0	853,0
1100 m		1058,2		1030,7	886,8
1200 m		1109,4		1079,4	920,6
1400 m				1176,8	988,2
1600 m				1274,2	1055,8
1800 m				1371,6	1123,4
2000 m				1469,0	1191,0

* Maintenance cost of MM62.5 is lower than MM50
in bold Recommended fibre

Example (Gigabit Ethernet transmission with a *GIGAlite* MM62.5 fibre @ 850 nm):



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10 Gigabit Ethernet (IEEE802.ae)

The following price comparison is based on following parameters:

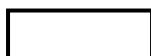
- 8 fibre cable
- 16 connectors
- 8 GBICs (VCSEL @ 850 nm & LASER @ 1300 nm)
- Connector assembly cost
- Installation cost

Price comparison between the different fibre types related to installed cable length.

Basis : Factor 100 = **Fast Ethernet** with a MM62.5 GIGAlite, installed length : 25 m

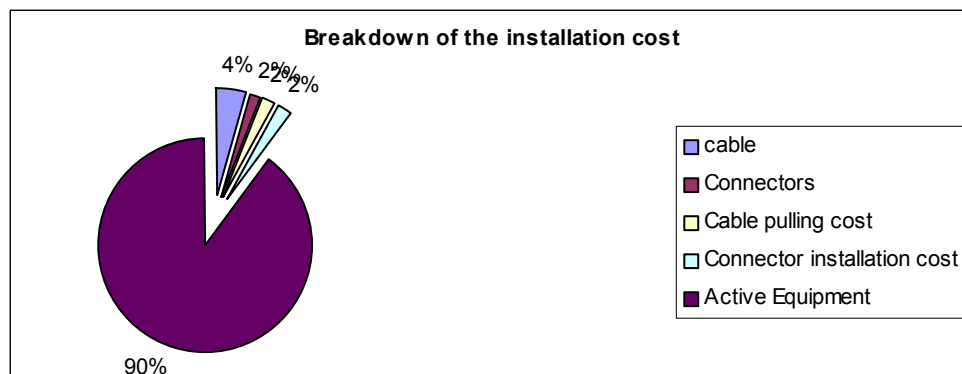
	Wavelength 850 nm					
	MM62.5 GIGAlite	MM62.5 GIGAlite II	MM50 GIGAlite	MM50 GIGAlite II	MM50 GIGAlite 3	MM50 GIGAlite 4
Length						
25 m	1056,8	1057,8	1055,5	1057,2	1062,3	1067,5
50 m		1070,6	1065,9	1069,4	1079,5	1090,0
75 m			1076,4	1081,5	1096,8	1112,5
100 m				1093,7	1114,0	1135,0
125 m				1105,9	1131,3	1157,5
150 m					1148,5	1180,0
175 m					1165,8	1202,5
200 m					1183,0	1225,0
225 m					1200,3	1247,5
250 m					1217,5	1270,0
275 m					1234,8	1292,5
300 m					1252,0	1315,0
350 m						1360,0
400 m						1405,0
450 m						1450,0
500 m						
550 m						
600 m						
650 m						
700 m						
750 m						
800 m						
900 m						
1000 m						
1100 m						
1200 m						
1400 m						
1600 m						
1800 m						
2000 m						

	Wavelength 1310 nm
	SM
Length	
25 m	1573,5
50 m	1581,9
75 m	1590,4
100 m	1598,8
125 m	1607,3
150 m	1615,7
175 m	1624,2
200 m	1632,6
225 m	1641,1
250 m	1649,5
275 m	1658,0
300 m	1666,4
350 m	1683,3
400 m	1700,2
450 m	1717,1
500 m	1734,0
550 m	1750,9
600 m	1767,8
650 m	1784,7
700 m	1801,6
750 m	1818,5
800 m	1835,4
900 m	1869,2
1000 m	1903,0
1100 m	1936,8
1200 m	1970,6
1400 m	2038,2
1600 m	2105,8
1800 m	2173,4
2000 m	2241,0



Recommended fibre

Example (10 Gigabit Ethernet transmission with a *GIGA*lite II MM50 fibre @ 850 nm):



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Technical Data

	MM62.5 @ 850 nm	MM50 @ 850 nm	SM G652 @ 1300 nm
GIGAlite (Standard range)	<u>Guaranteed distances :</u> Fast Ethernet : 300 m Gigabit Ethernet : 275 m 10 Gigabit Ethernet : 33 m (OM1 compliant)	<u>Guaranteed distances :</u> Fast Ethernet : 300 m Gigabit Ethernet : 550 m 10 Gigabit Ethernet : 82 m (OM2 compliant)	<u>Guaranteed distances :</u> Fast Ethernet : 2000 m Gigabit Ethernet : 10000 m 10 Gigabit Ethernet: 10000 m (OS1 compliant)
GIGAlite II	<u>Guaranteed distances :</u> Fast Ethernet : 300 m Gigabit Ethernet : 600 m 10 Gigabit Ethernet : 50 m (Enhanced OM1 compliant + LASER certified)	<u>Guaranteed distances :</u> Fast Ethernet : 300 m Gigabit Ethernet : 800 m 10 Gigabit Ethernet : 125 m (Enhanced OM2 compliant + LASER certified)	NA
GIGAlite 3	NA	<u>Guaranteed distances :</u> Fast Ethernet : 300 m Gigabit Ethernet : 800 m 10 Gigabit Ethernet : 300 m (OM3 compliant + LASER certified)	NA
GIGAlite 4	NA	<u>Guaranteed distances :</u> Fast Ethernet : 300 m Gigabit Ethernet : 800 m 10 Gigabit Ethernet : 450 m (Enhanced OM3 compliant + LASER certified)	NA

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Transmission (Max. distance versus application & fibre type)

@ 850 nm		Fibre type					
		<i>GIGAlite</i> MM62.5	<i>GIGAlite II</i> MM62.5	<i>GIGAlite</i> MM50	<i>GIGAlite II</i> MM50	<i>GIGAlite 3</i> MM50	<i>GIGAlite 4</i> MM50
Application	Fast Ethernet	300 m	300 m	300 m	300 m	300 m	300 m
	Gigabit Ethernet	275 m	600 m	550 m	800 m	800 m	800 m
	10 Gigabit Ethernet	33 m	50 m	82 m	125 m	300 m	450 m

@ 1300 nm		Fibre type						
		<i>GIGAlite</i> MM62.5	<i>GIGAlite II</i> MM62.5	<i>GIGAlite</i> MM50	<i>GIGAlite II</i> MM50	<i>GIGAlite 3</i> MM50	<i>GIGAlite 4</i> MM50	SM (G652)
Application	Fast Ethernet	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m
	Gigabit Ethernet	550 m	1200 m	550 m	2000 m	550 m	550 m	10,000 m
	10 Gigabit Ethernet	-	-	-	-	-	-	10,000 m

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Technical Data

Optical parameters

Fibre type	MM62.5 (1)	MM50 (2)
Attenuation @ 850 nm		
Typical	3.0 dB/km	2.6 dB/km
Max.	3.5 dB/km	3.2 dB/km
Attenuation @ 1300 nm		
Typical	0.8 dB/km	0.8 dB/km
Max.	1.5 dB/km	1.3 dB/km
Numerical aperure	0.27 ±0.02	0.20 ±0.02

(1) Valid for both MM62.5 fibre (**GIGAlite** and **GIGAlite II**)

(2) Valid for all MM50 fibre (**GIGAlite**, **GIGAlite II**, **GIGAlite 3** and **GIGAlite 4**)

Fibre Type	SM (G652)
Attenuation @ 1310 nm	
Typical	0.35
Max.	0.42
Attenuation @ 1550 nm	
Typical	0.22
Max.	0.28
Dispersion (ps/nm.km)	
1285 – 1330 nm	< 3.5
1550 nm	< 18
Cut-off wavelength (nm)	1150-1330
Zero dispersion (nm)	1310 ± 10
Dispersion mode polarisation (ps/√km)	≤ 0.2

Geometrical parameters

Fibre type	MM62.5 (1)	MM50 (2)
Core diameter (µm)	62.5 ± 3	50 ± 3
Cladding diameter (µm)	125 ± 2	125 ± 2
Coating diameter (µm)	250 ± 15	250 ± 15
Core non-circularity (%)	< 6	< 6
Concentricity error (µm)	≤ 1.5	≤ 1.5

Fibre type	SM (G652)
Mode field diameter (µm)	9.2 ± 0.5
Cladding diameter (µm)	125 ± 1
Coating diameter (µm)	245 ± 10
Core non-circularity (%)	< 6
Cladding non-circularity (%)	< 2

(1) Valid for both MM62.5 fibre (**GIGAlite** and **GIGAlite II**)

(2) Valid for all MM50 fibre (**GIGAlite**, **GIGAlite II**, **GIGAlite 3** and **GIGAlite 4**)