

Power Budget Calculations for LANstore Fiber Transceivers

Receiver Sensitivity and Transmitter Power are the primary parameters necessary to compute the power budget available. To calculate the power budget of different fiber media installations using LANstore products, the following equations should be used:

$$\text{OPB (Optical Power Budget)} = P_T(\text{min}) - P_R(\text{min})$$

where P_T = Transmitter Output Power, and P_R = Receiver Sensitivity

Worst case OPB = OPB - 1dB(for LED aging) - 1dB(for insertion loss)

Worst case distance = {Worst case OPB, in dB} / [Cable Loss, in dB/Km]

where the “Cable Loss” for 62.5/125 and 50/125 μm (M.m) is 2.8 dB/km,

and the “Cable Loss” for 100/140 (Multi-mode, 850nm) is 3.3 dB/km,

and the “Cable Loss” for 9/125 (Single-mode, 1310nm) is 0.5 dB/km (a worst case industry number)

and the “Cable Loss” for 9/125 (Single-mode, 1310nm) is 0.4 dB/km

and the “Cable Loss” for 9/125 (Single-mode 1550nm) is 0.25 dB/km

and the “Cable Loss” for 9/125 (Single-mode 1550nm) is 0.2 dB/km

The following data has been collected from component manufacturer’s (Agilent and Lucent) web sites and catalogs to provide guidance to network designers and installers.

Fiber Port Connector Type	Speed, Std.	Mode	Std. km fdx (hdx)	Wave-length nm	Cable Size μm	X'mitr Output P_T , dB	R'evr Sens. P_R , dB	Worst OPB, dB	Worst* distance Km, fdx	typical OPB, dB	typical* distance Km, fdx
(ST)	10 Mb FL	Multi-	2 (2)	850	62.5/125 100/140 50/125	-15.0 -9.5 -19.5	-31 -31 -31	14 19.5 9.5	5 5.9 3.4	17 23.5 13.5	6 7 4.8
(ST)	10 Mb FL	Single-	10 (5)	1310	9/125	-30.0	-39	7	14	13	26
(ST or SC)	100 Mb FX	Multi-mode	2 (0.4)	1310	62.5/125 50/125	-20 -23.5	-31 -31	9.0 5.5	3.0 2.0	14 12	5 4
(SSC)	100 Mb FX	Single-	18+ (0.4)	1310	9/125	-15	-31	14	28	17.5	35
(MTRJ)	100 Mb FX	Multi-	2 (0.4)	1310	62.5/125 50/125	-19 -23.5	-31 -31	10 5.5	3.5 2.0	15.8 12.2	5.5 4.0
(MLC)	100 Mb FX	Multi-	2 (0.4)	1310	62.5/125	-19	-31	12	4	16	5.7
(SLC)	100 Mb FX	Single-	15+	1310	9/125	-15	-28	11	22	-	-
(SSCL Long Reach)	100 Mb FX	Single-	40	1310	9/125	-5	-34	29	58	32.5	65
(SSCX 1510nm spl.)	100 Mb FX	Single-	100	1550	9/125	-3	-34	31	105	-	-
(SXSC GBIC)	1000 Mb FX (Gigabit)	Multi -	0.55	1310	62.5/125 50/125	-9.5	-17	5.5	2	12.5	4
(LXSC 10) GBIC	1000 Mb FX (Gigabit)	Single-	10	1310	9/125	-9.5	-20	8.5	17	10.5	21
(LXSC 25) GBIC	1000 Mb FX (Gigabit)	Single-	25	1310	9/125	-4.0	-21	15	38	17.5	43
(ZXSC 40) GBIC	1000 Mb FX (Gigabit)	Single-	40	1550	9/125	-4.0	-21	15	60	17.5	70
(ZXSC 70-80) GBIC	1000 Mb FX (Gigabit)	Single-	70	1550	9/125	-3.0	-23	18	90	20.5	102

* Note: The use of either multi-mode or single-mode fiber to operate at 100 Mbps speed over long distances (i.e., over approx. 400 meters) can be achieved **only** if the following factors are both applied:

- The 100 Mb fiber segment must operate in full-duplex (FDX) mode
- The worst-case OPB of the fiber link must be greater than the fiber cable’s passive Attenuation.

(Attenuation = Cable loss + LED aging loss + Insertion loss + safety factor)