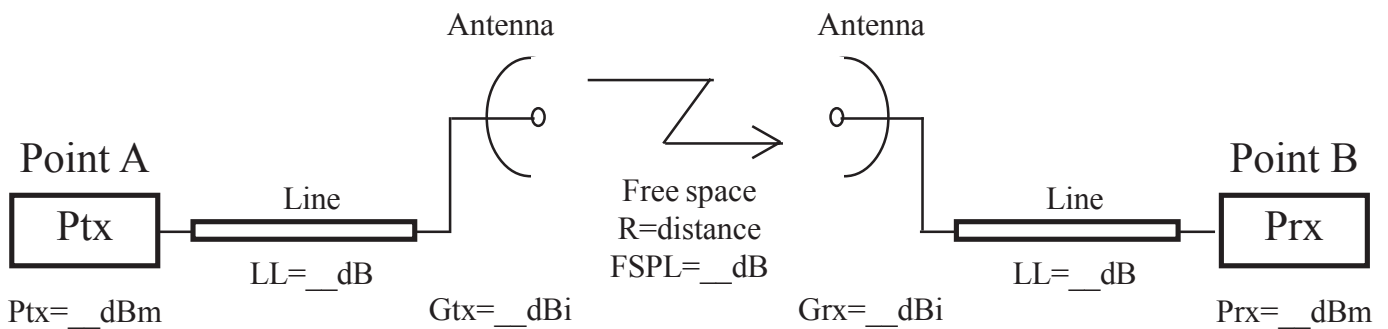


## Formula for W-LAN system

### Point to Point distance calculation (without obstacle)

$$Prx = Ptx - LL + Gtx - FSPL + Grx - LL$$

- Prx* = Received Power in dBm.
- Ptx* = Output equipment Power in dBm. 20dBm = 100 mW
- LL* = Line Loss, cable attenuation in dB.
- Gtx* = Gain of the transmitting antenna in dBi.
- FSPL* = Free Space Path Loss, signal attenuation in dB (open space).
- Grx* = Gain of receiving antenna in dBi.



#### Free space attenuation table:

Distance	FSPL
R=0.5 km	94 dB
R=1 km	100 dB
R=2 km	106 dB
R=4 km	112 dB
R=8 km	118 dB
R=10 km	120 dB
R=16 km	124 dB

#### Cable attenuation table: CO 100 at 2.45 GHz

Cable length	Cable attenuation	Cable + connector attenuation
5 m	2.65 dB	about 3 dB
10 m	5.3 dB	about 6 dB
15 m	7.95 dB	about 9 dB
20 m	10.6 dB	about 12 dB

Example:  $Ptx=+20$  dBm,  $LL=3$  dB,  $Gtx=+21$  dBi,  $R=10$  km,  $Grx=+21$  dBi,

$$Prx = +20 - 3 + 21 - 120 + 21 - 3 = -64 \text{ dBm}$$

Receiving sensibility with datarate 54 Mbit/s = -70 dBm.

Security receiving gap = 5/6 dB. Effective gap = +6 dB

## Formula per il calcolo della distanza di trasmissione punto-punto in vista ottica (senza ostacoli) per sistema W-LAN

$$Prx = Ptx - LL + Gtx - FSPL + Grx - LL$$

*Prx* = Potenza ricevuta in dBm.

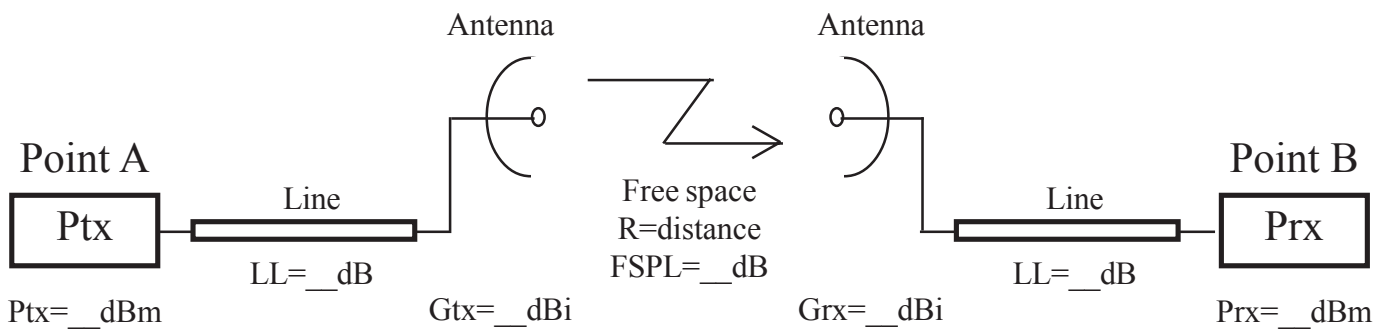
*Ptx* = Potenza di uscita del dispositivo in dBm. 20dBm = 100 mW

*LL* = Line Loss, attenuazione del cavo in dB.

*Gtx* = Guadagno antenna trasmittente in dBi.

*FSPL* = Free Space Path Loss, attenuazione segnale in spazio aperto in dB.

*Grx* = Guadagno antenna ricevente in dBi.



### Tabella per calcolo attenuazione in aria:

Distanza	FSPL
R=0.5 km	94 dB
R=1 km	100 dB
R=2 km	106 dB
R=4 km	112 dB
R=8 km	118 dB
R=10 km	120 dB
R=16 km	124 dB

### Tabella attenuazione cavo CO 100 a 2.45 GHz

Lunghezza cavo	Attenuaz. cavo	Attenuaz. cavo e connettori
5 m	2.65 dB	circa 3 dB
10 m	5.3 dB	circa 6 dB
15 m	7.95 dB	circa 9 dB
20 m	10.6 dB	circa 12 dB

Esempio:  $Ptx=+20$  dBm,  $LL=3$  dB,  $Gtx=+21$  dBi,  $R=10$  km,  $Grx=+21$  dBi,

$$Prx = +20 - 3 + 21 - 120 + 21 - 3 = -64 \text{ dBm}$$

Sensibilità ricevitore con datarate 54 Mbit/s = -70 dBm.

Margine di sicurezza da mantenere sempre = 5/6 dB. Margine effettivo = +6 dB