1. For radio transmission in free space signal power is reduced in proportion to the square of distance from the source whereas in wire transmission attenuation is a fixed number of Db per kilometre. The following table is used to show the Db reduction relative to some reference for free space radio and uniform wire. Fill the missing numbers to complete the table.

|  |  |  |
| --- | --- | --- |
| Distance(KM) | Radio(dB) | Wire(dB) |
| 1 | -6 | -3 |
| 2 | -12 | -6 |
| 4 | -18 | -12 |
| 8 | -24 | -24 |
| 16 | -30 | -48 |

**Radio Channel**

Ldb =10 log(P0/Pr)  
 = 10 log(4πd/ λ)2  
 = 20log(4πd/ λ)  
 = 20log(d) + 20log(4π/ λ)

Putting the value of Distance 1Km in above equation

6= 20log(1) + 20log(4π/ λ)  
6 = 20log(4π/ λ)

For d=2,4,8,16  
d = 2  
Ldb = 20log(d) + 20log(4π/ λ)  
 = 20log(2) + 6  
 = 6.02 + 6  
 = 12.02  
  
d = 4  
Ldb = 20log(d) + 20log(4π/ λ)  
 = 20log(4) + 6  
 = 12.04 + 6  
 = 18.04

d = 8  
Ldb = 20log(d) + 20log(4π/ λ)  
 = 20log(8) + 6  
 = 18.06 + 6  
 = 24.06

d = 16  
Ldb = 20log(16) + 20log(4π/ λ)  
 = 20log(d) + 6  
 = 24.08+ 6  
 = 30.08  
  
  
**Wired Channel:**

Attenuation α (distance)  
Attenuation = K \* Distance  
3=K\*1  
K=1

For d = 2,4,8,16  
  
Attenuation = K \* Distance  
Attenuation = 3\*Distance  
  
For d=2  
Attenuation = 3 \* d = 3 \* 2  
Attenuation = 6

For d=4  
Attenuation = 3 \* d = 3 \* 4  
Attenuation = 12  
  
for d=8  
Attenuation = 3 \* d = 3 \* 8  
Attenuation = 24  
  
for d=16  
Attenuation = 3 \* d = 3 \* 16  
Attenuation = 48