IOT NOTES

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1. NFU

Digital comunication

Digital comunication is based on wave signals comunications. When having this kind of signals we can compute:

1. Energy of the wave:

$$E[J] = \int_{d1}^{d2} dx \frac{s^2(t)}{R} dt$$

Being:

- d1 = starting distance of the signal.
- d2 = ending distance of the signal.
- $s(t)$ = equation of the signal in function of time. Usually: $A\cos(2\pi f_c T)$
- R = resistance. Usually 50 Ω

2. Power Transmited [W]:

$$\frac{E}{D}$$

Being:

- E = energy of the wave.
- D = distance of the wave = (d2-d1)

3. Power Received:

- $[W]$: $\frac{Pt[W]}{L \text{ (Loss of the channel)}}$
- $[dBW]$: $Pt[dBW] - L[dB]$
- $[dBm]$: $Pt[dBm] - L[dB]$

Data Rate: Number of information bits per second transmitted.
Bit Rate: Number of bits per second transmitted when source is active.
User Throughput (U): Number of information bits per second received.
Bit Error Rate (BER): Percentage of erroneous bits.
Block Error Rate (BER): Percentage of erroneous data blocks.
Energy Efficiency (EE): Number of information bits received per joule.

$$E = E1 + E2 + E3 + E4$$

Being:

- E1 = energy consumed by the source.
- E2 = energy consumed by the transmitter.
- E3 = energy consumed by the receiver.
- E4 = energy consumed by the destination.

E3 and E4 are neglictable if the device is connected to the electric grid