Escola d'Enginyeria de Telecomunicació i Aeroespacial de Castelldefels
UNIVERSITAT POLITÈCNICA DE CATALUNYA

Lab Report
RADIOLOCALIZATION

RADAR EQUATION

Jordi Berenguer
José M. González
Jordi Mateu

2.1. Design a MATLAB function allowing computing the radar (SNR) equation corresponding for a monostatic radar with just one antenna. Function inputs and outputs are provided in the following table:

Inputs	Peak power [W]
	Antenna gain [dBi]
	Carrier frequency [Hz]
	Bandwidth [Hz]
	Noise figure [dB]
	Additional losses [dB]
	Radar cross section [m^2]
	Array of target ranges [m]
Outputs	**Array of** signal to noise ratios [dB]

2.2. Using the previous function calculate the signal to noise ratios for the scenario provided in the table below. Make two plots of the SNR with respect to target range: first in linear scale, and secondly in log scale for the range (use MATLAB function ***semilogx***). This second plot is useful to check the SNR dependence with range.

Peak power:	1.5 MW
Antenna gain:	45 dBi
Carrier frequency:	5.6 GHz
Bandwidth:	5 MHz
Noise figure:	3 dB
Additional losses:	0 dB
Radar cross section:	1 m^2
Target ranges:	from 20 to 200 km

2.3. Make a new graph of the signal to noise ratio with respect to target range (using the same scenario than exercise 2.2) but for three radar cross sections: 0 dBm^2, -10 dBm^2, and -20 dBm^2. Overlap the three plots in the same graph. Make a comment about the resulting figure.

2.4. Make a new graph of the signal to noise ratio with respect to target range (using the same scenario than exercise 2.2) but considering that peak power is increased 3 dB and 6 dB with respect to its initial value. Overlap the three plots in the same graph. Make a comment about the resulting figure.

2.5. Consider additional losses (choose a value, for instance 10 dB) to the scenario of exercise 2.2. Compare the results of exercise 2.2 and the new ones. Make a comment about the resulting plots.