1.2.3 Receiver noise floor

Any practical measurement will be subject to some form of noise or unwanted signal (thermal noise or interfering signals). The noise floor limits the smallest measurement that can be taken with certainty since any measured amplitude cannot on average be less than the noise floor.

The noise floor (*N*) is the level of noise introduced by the receiver system below which the signal that is being captured cannot be isolated from the noise, and is defined in dBm as:

$$N\ (dBm) = N_0\ (dBm) + NF\ (dB) \quad (Eq.\ 4)$$

or in linear domain:

$$N\ (Watts) = 10\text{^}((-173.977 + 10*\log_{10}(systemBandwidth\ (Hz)) + NF)/10) \quad (Eq.\ 5)$$

As an example, in SEAMCAT, for a receiver with a noise figure of 9 dB and a bandwidth of 5 MHz, the noise floor will be

$$-173.977\ dBm/Hz + 60\ dB/MHz + 10*\log_{10}(5\ MHz) + 9\ dB = -98\ dBm$$

Another example is that for a noise figure of 4 dB and a bandwidth of 200 kHz with thermal noise = kTB = -121 dBm, the noise floor is -117 dBm.

In SEAMCAT, the input is the distribution of the strength of the noise floor. This parameter is used for the probability calculation when the criteria is C/(N+I), (I/N) or (I+N)/N.

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