

4.8 Protection distance

If a minimum protection distance between the victim link receiver and interfering link transmitter is introduced then the simulation radius may then be calculated by using the following formula:

$$R_{simu} = \sqrt{\frac{n^{active}}{\pi \times dens_{it}^{active} \times prob_{transmission}} + d_0^2} \quad (Eq. 30)$$

Note: The calculation of the iRSS at each trial will be performed only if the location of the ILT satisfies the following condition $d_{it \rightarrow vr} \geq d_0$.

Figure 129 presents how to set-up SEAMCAT (See also A13.2 for further details).

The screenshot shows the SEAMCAT software interface for configuring the 'Relative positioning of Interfering Link'. The 'Transmitter to Victim Link Receiver Path' tab is selected. The configuration includes the following parameters:

- Mode:** Uniform density (highlighted with a red box)
- Position relative to:** Victim Link Receiver (selected with a radio button)
- Delta X:** [Constant(0.0)] with a 'Distribution' button and unit 'km'
- Delta Y:** [Constant(0.0)] with a 'Distribution' button and unit 'km'
- Set ILR at the center of the ILT distribution
- Path azimuth:** [UniformDistri...] with a 'Distribution' button and unit 'deg'
- Path distance factor:** [Uniform Polar...] with a 'Distribution' button
- Simulation radius:** 1.0 km
- Number of active transmitters:** 1 (highlighted with a red box)
- To position with [dropdown menu] (with an information icon 'i')
- Delta x:** [Constant(0.0)] with a 'Distribution' button and unit 'km'
- Delta y:** [Constant(0.0)] with a 'Distribution' button and unit 'km'
- Minimum Coupling...:** [Constant(0.0)] with a 'Distribution' button and unit 'dB'
- Protection distance:** [Constant(0.5)] with a 'Distribution' button and unit 'km' (highlighted with a red box)

Figure 129: Setting up the protection distance related to the simulation radius with 1 active interferer

The simulation radius (see Figure 131) may then be calculated by using the following formula:

$$R_{simu} = \sqrt{\frac{1}{\pi \times 10} + (0.5)^2} = 0.531 km$$

Calculated Radius			
Victim Link Transmitter - Coverage radi...	km	Double	
Interfering Link Transmitter 1 - Coverag	km	Double	
Interfering Link Transmitter 1 - Simulati...	0.5308775646214285	km	Double

Figure 130: Calculated simulated radius

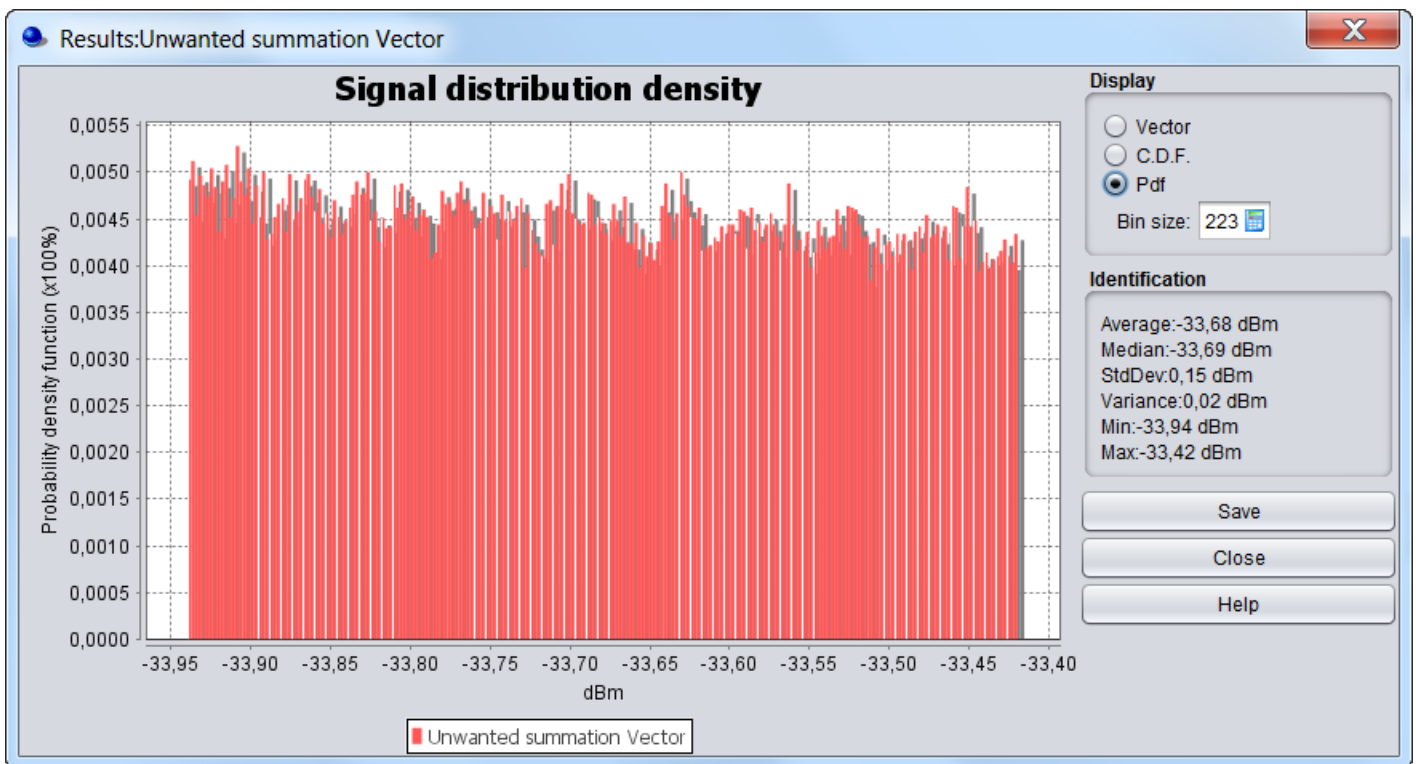


Figure 131: Calculation of the simulation radius and the $iRSS_{unwanted}$ using the protection distance (for 1 active interferer)

If the distance between the VLR and the ILT is equal to the protection distance (0.5 km), then:

$$iRSS_{unwanted} = 33(dBm) + 11 + 9 - (32.5 + 10\log(0.5 \times 0.5) + 20\log(1000)) = -33.5dBm$$

If the distance between the VLR and the ILT is equal to the simulation radius (0.531 km), then:

$$iRSS_{unwanted} = 33(dBm) + 11 + 9 - (32.5 + 10\log(0.531 \times 0.531) + 20\log(1000)) = -34dBm$$

These results are in line with those depicted on Figure 131. We can then increase the number of active transmitters to 10 as shown in Figure 132.

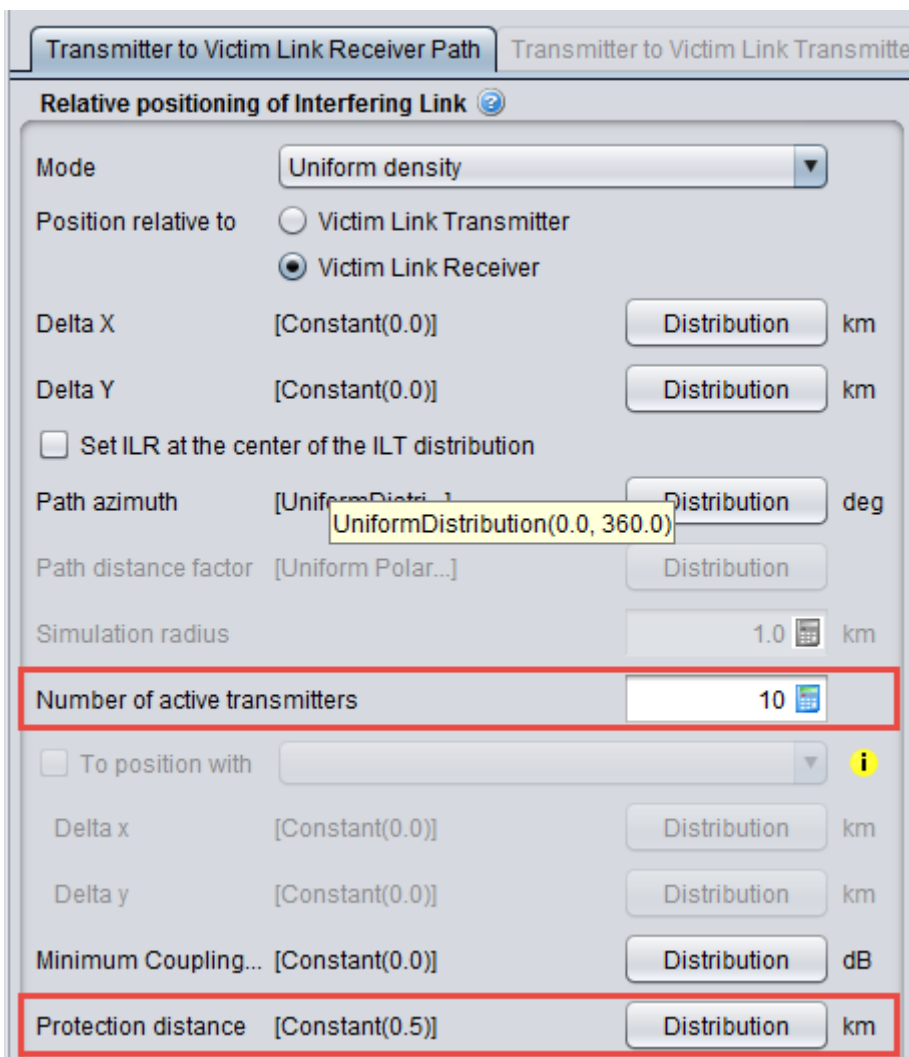


Figure 132: Setting up the protection distance related to the simulation radius with 10 active interferer

The simulation radius may then be calculated by using the following formula (see Figure 133 for the result):

$$R_{simu} = \sqrt{\frac{10}{\pi \times 10} + .5 \times 0.5} = 0.75km$$

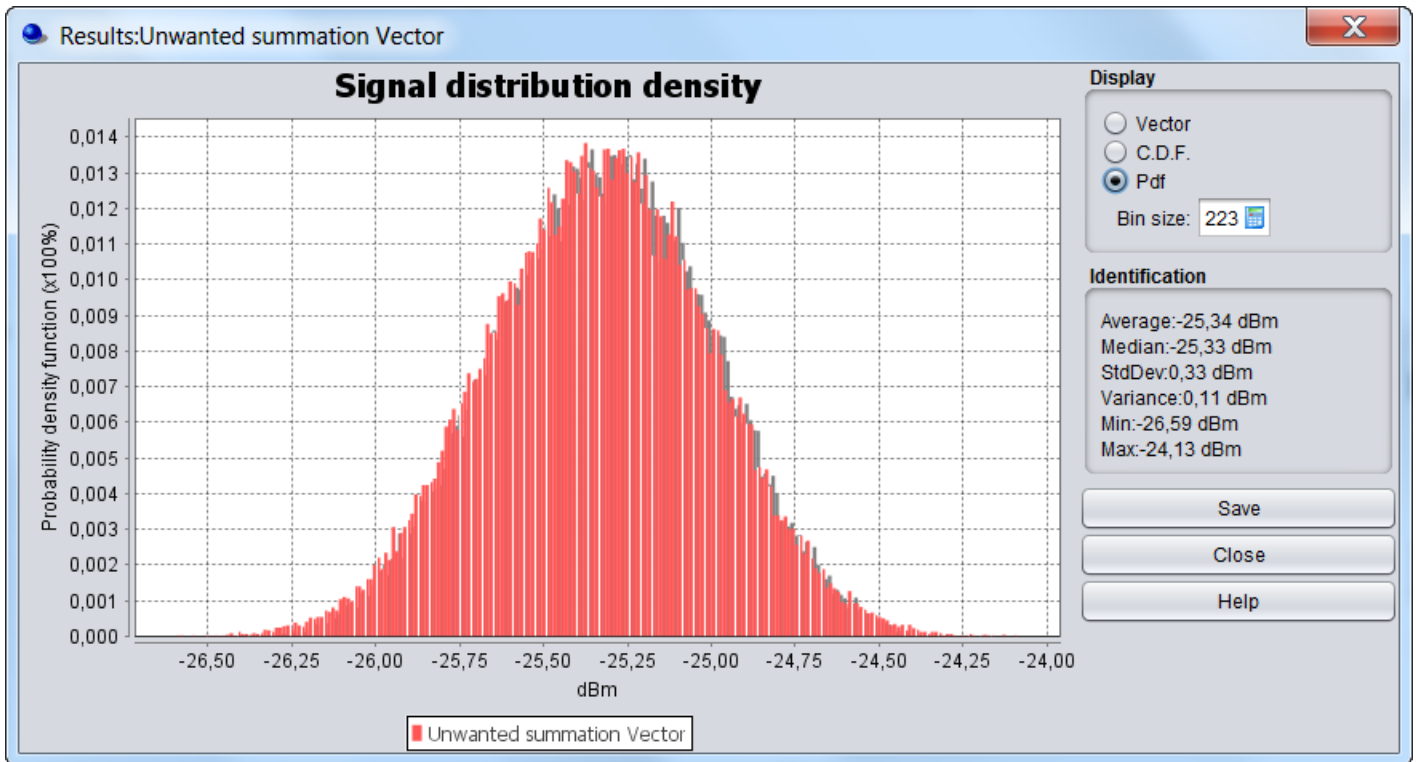


Figure 133: Calculation of the R_{simu} and the $iRSS_{unwanted}$ using the protection distance (for 10 active interferer)

If the distance between the VLR and a single ILT is equal to the protection distance, then:

$$iRSS_{unwanted} = 33(dBm) + 11 + 9 - (32.5 + 10\log(0.5 \times 0.5) + 20\log(1000)) = -33.5dBm$$

If the distance between the VLR and a single ILT is equal to the simulation radius, then:

$$iRSS_{unwanted} = 33(dBm) + 11 + 9 - (32.5 + 10\log(0.75 \times 0.75) + 20\log(1000)) = -37dBm$$

If 10 transmitters are deployed around the VLR then:

$$iRSS_{unwanted} = -37(\text{dBm}) + 10\log(10) = -27\text{dBm} \text{ and}$$

$$iRSS_{unwanted} = -33.5(\text{dBm}) + 10\log(10) = -23.5\text{dBm}$$

$$-27\text{dBm} < iRSS_{unwanted} < -23.5\text{dBm} \text{ (see Figure 133)}$$

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