

## Multiple Interferers generation

SEAMCAT allows various options to generate multiple interferers. This is described in the following sections.

### 1 OPTION 1

This option allows SEAMCAT to generate multiple interferers which may have the same or different technical characteristics from each other. This is illustrated in Figure 1.

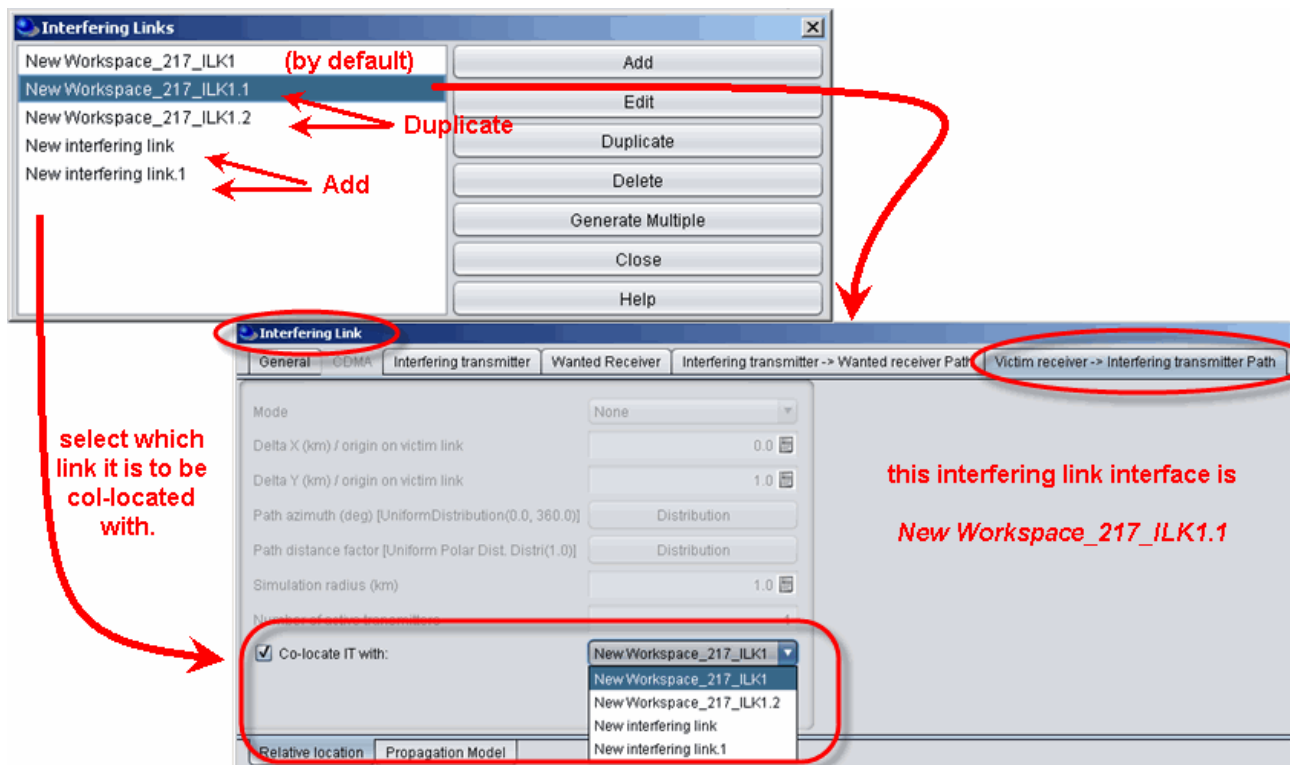


Figure 1: Generation of multiple interferers which may have different technical characteristics from each other.

The feature “co-locate” allows the deployment of a second type of interferer (for instance New Workspace\_217\_ILK1.1) for which the transmitters will be located at the same location as the transmitters of another type of interferers (i.e. New Workspace\_217\_ILK1 or New interfering link 1, etc..). This feature is of interest since it allows deploying these two interferers at the same location (i.e. with the same coordinates) and these two transmitters could be transmitting at the same time while having different transmitter characteristics (e.g. emission mask, antenna radiation pattern...).

Note: If for one interfering link (e.g. New Workspace\_217\_ILK1.1) the number of active transmitter is one, then for any extra interfering links (e.g. New interfering link 1), only one Tx (i.e. New interfering link 1) is simulated. When the “co-locate” feature is selected, any values are grey shaded and only one transmitter is simulated.

## 2 OPTION 2: AUTO-GENERATION OF MULTIPLE INTERFERING LINKS

### 2.1 Introduction

This option corresponds to duplicate  $n$  times a specific interfering links on a circle or on a hexagonal grid as illustrated in Figure 2 (a) and (b) respectively. These interferers have the same characteristics as the reference interfering link (i.e. New Workspace\_234\_ILK1 in **Error! Reference source not found.**). It has the purpose of automatically generating a regular pattern of interfering links.

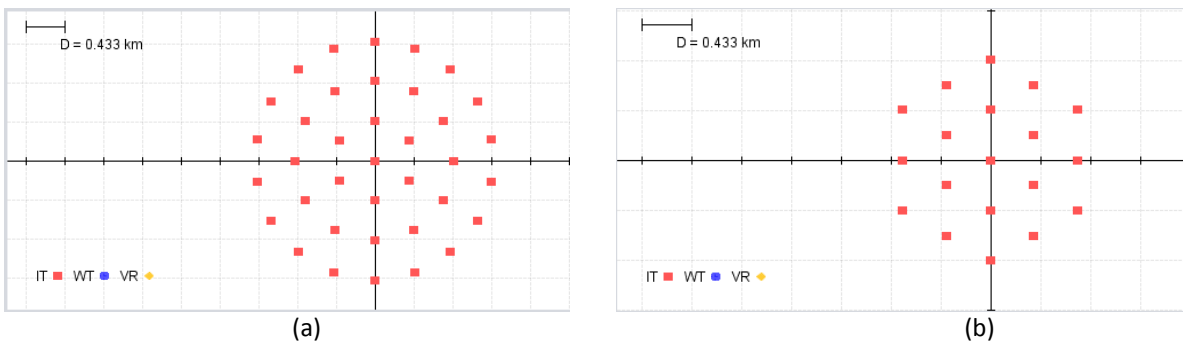


Figure 2: (a) Circular and (b) hexagonal layout

### 2.2 How to access the multiple generate feature

To use the auto-generation of such regularly spaced interfering links, the user may use command **Generate Multiple** in the interfering Links dialog box (option 1) or **Generate Multiple Interfering Systems** in the **Tools** menu (option 2) as shown in Figure 3 **Error! Reference source not found.**. Both options will lead to the same calculation results.

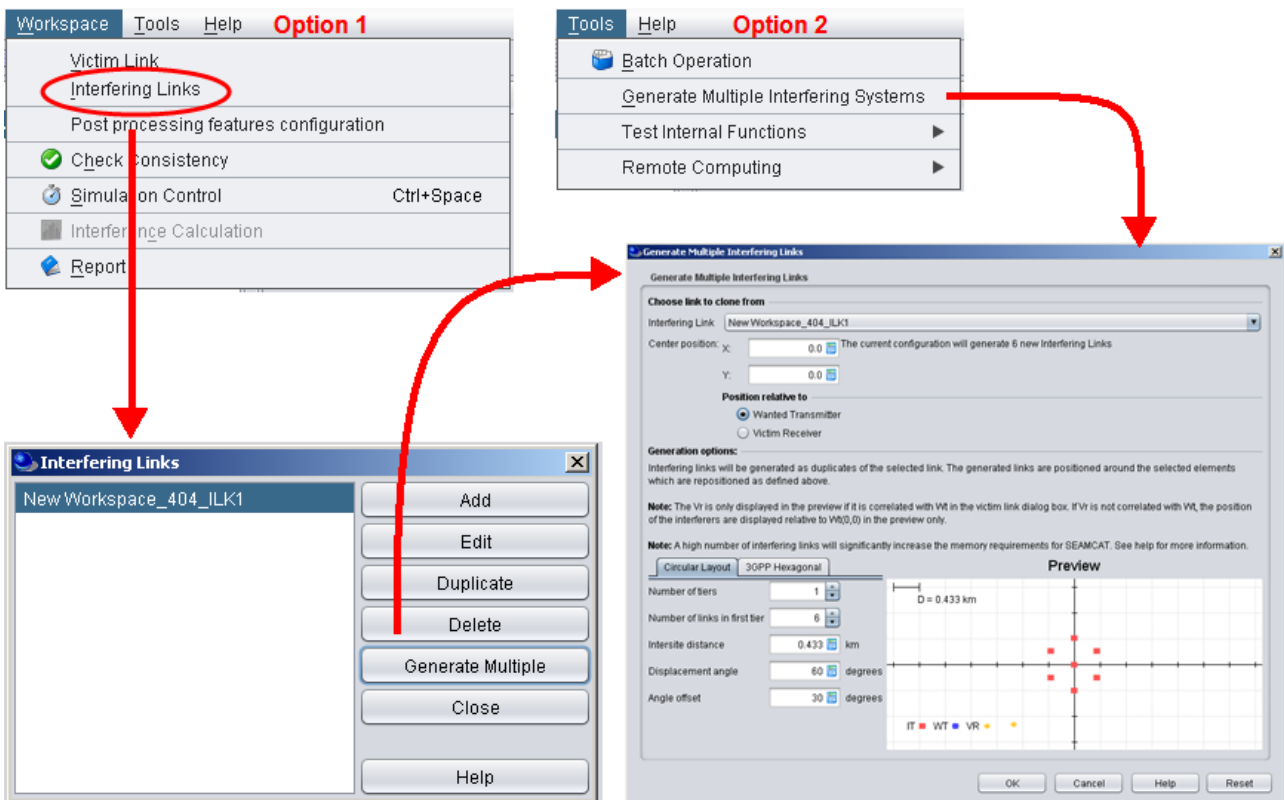


Figure 3: How to access the auto generation of interfering link

### 2.3 The multiple generate feature graphical interface

The multiple generate feature graphical interface consists of 3 parts:

- Selection of the reference interferer (#1)
- Relative position of this reference interferer to the victim link (#2)
- Layout of the new interferers (#3)

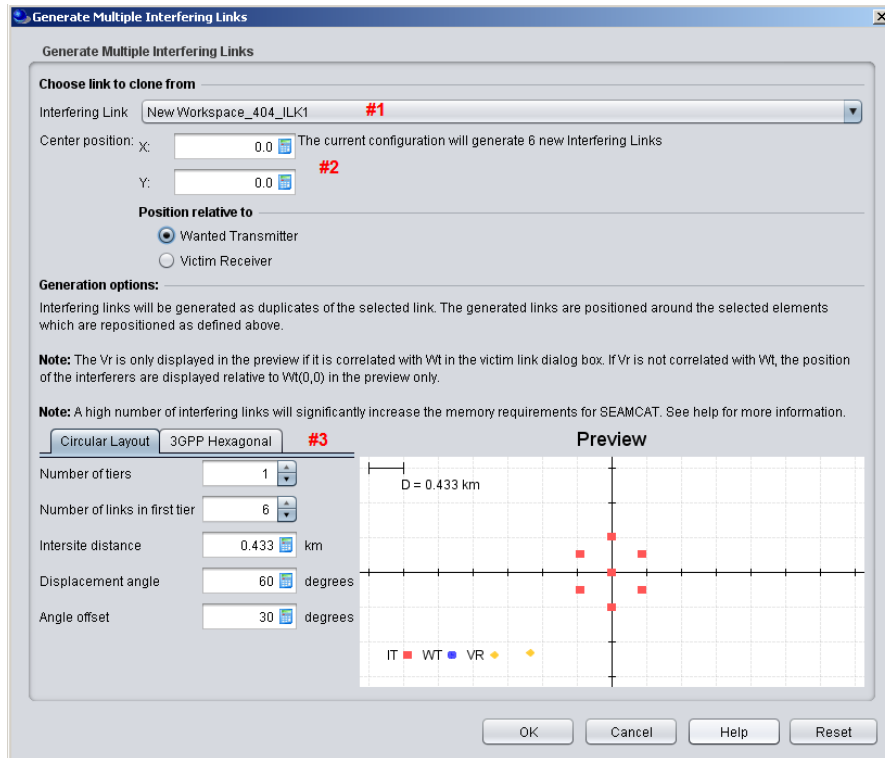


Figure 4: The multiple generate feature graphical interface

#### 2.3.1 Selection of the reference interferer

The user is to choose an interfering link that will be used to clone the new interferers as shown in Figure 5.

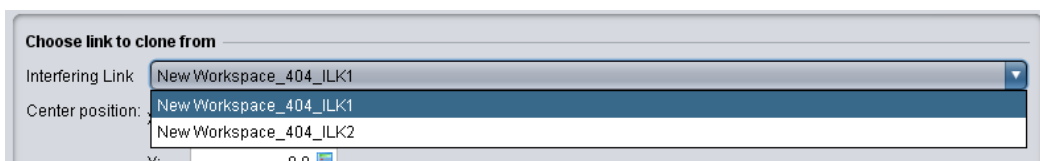


Figure 5: Selection of the reference interferers

In the Generate Multiple Interfering Link dialog box, when selecting ok, 6 new interferers will now be present in the workspace, centered to the selected interferer (i.e. New Workspace\_404\_ILK1). This is shown in the Figure 6.

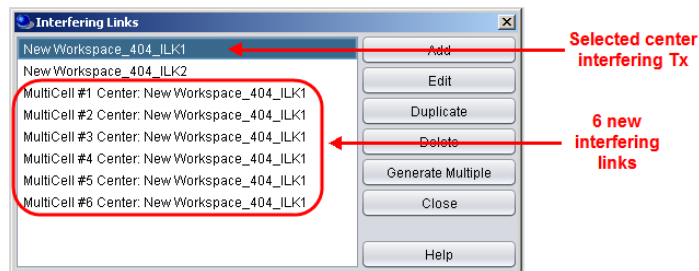


Figure 6: Generated new interferes

### 2.3.2 Relative position of this reference interferer to the victim link

It is possible to adjust the position of the interferers with respect to either the Wt (Wanted transmitter) or the Vr (Victim receiver). When the generate multiple feature is run the relative positioning of interfering link mode (i.e. in the victim receiver to interfering transmitter path tab) is by default overwritten to either Vr→It or Wt →It mode.

In the preview display, the Vr position is only shown if the victim receiver has been set to a fix point with respect to the Wt in the victim link dialog, as shown in Figure 7. In this example, the position of Vr is set to a fixed/correlated position ( x = 1 km and y = -2 km) from the Wt. If the position of the Vr to the Wt is set to a random distribution (i.e. non-correlated), the Vr point will not be displayed in the preview of the generate multiple.

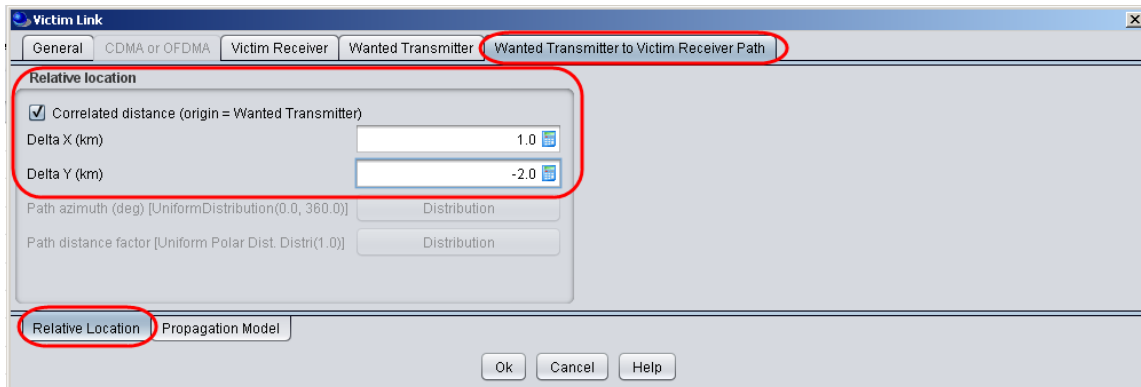


Figure 7: Relative position of the Vr with respect to Wt (correlated/non-correlated)

### 2.3.3 Layout of the new interferers

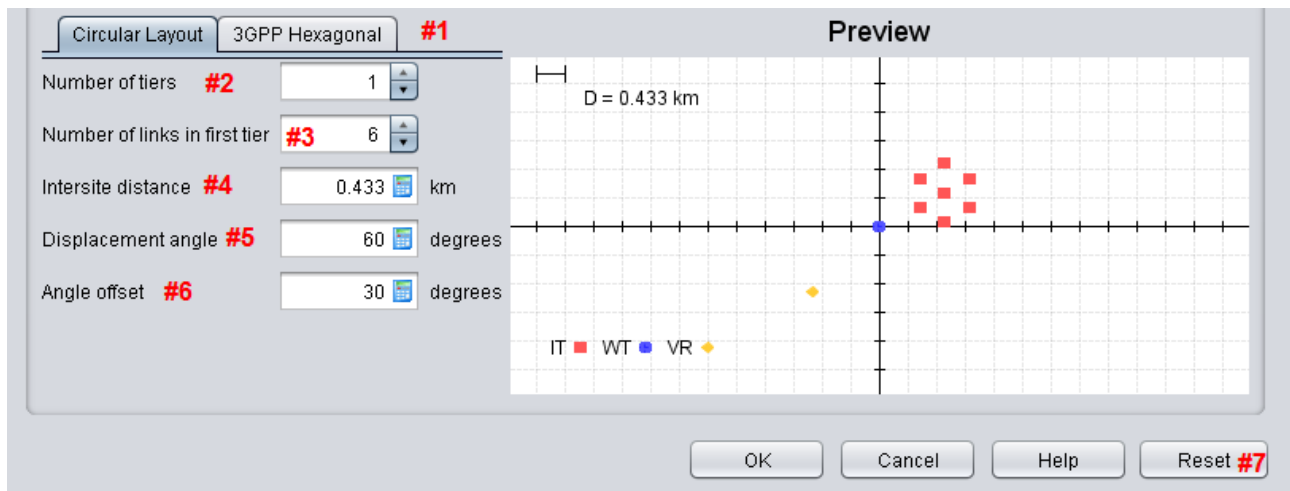
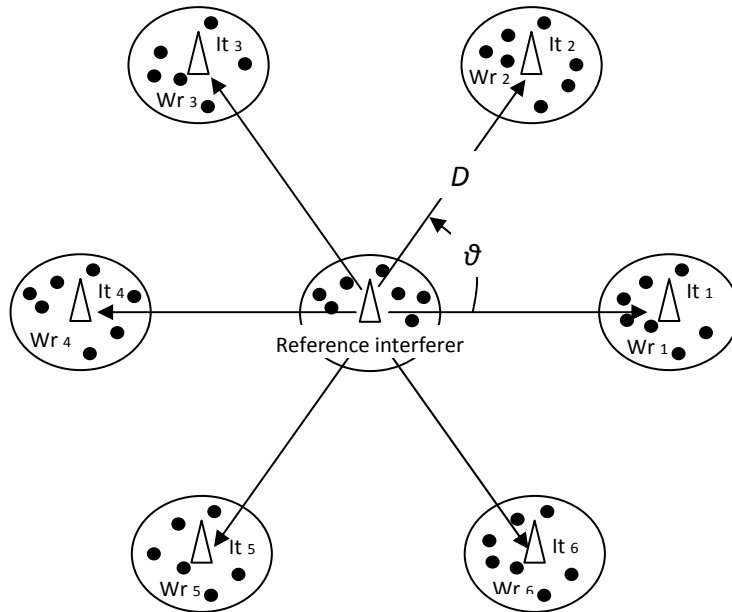


Figure 8: Relative position of the Vr with respect to Wt (correlated/non-correlated)

In the appearing dialog window, the user may select:

- between circular or hexagonal layout (#1),
- the number of tiers of generated multiple cells (#2),
- total number of links in the first tier (#3),
- the intersite distance parameter (#4) (corresponding to D in Figure 8 and Figure 9)
- the displacement angle (#5) ( $\theta$  in Figure 9) and
- the angle offset (#6) As illustrated in Figure 10.

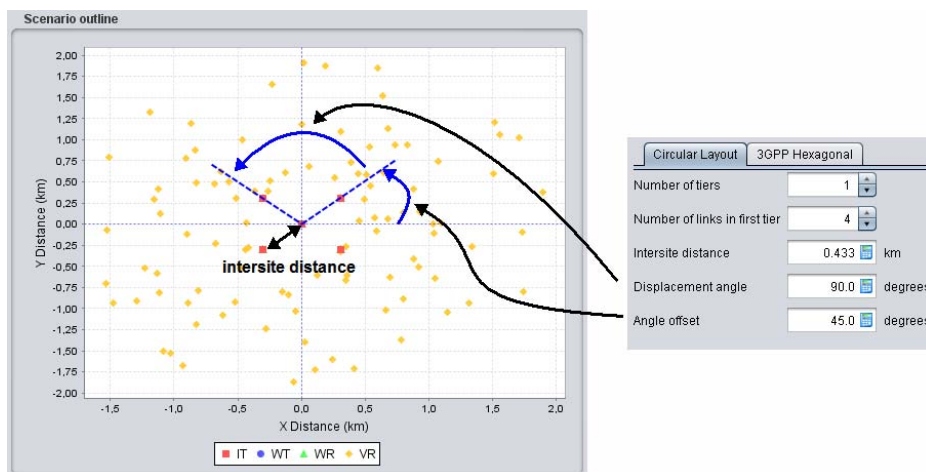


**Figure 9: Example of the auto-generation of multiple interfering links**

Figure 9 shows an example of scenario that may be used for estimating intra-service interference to a victim base station of cellular system from mobile transmitters operating in the next tier of co-channel cells of the same system.

The **displacement angle** is calculated automatically by the dialogue window by evenly spacing the specified number of cells around the 360 deg arc, but the user may amend this angle. e.g. in order to achieve placement of multiple cells in a sector of less than 360 deg. The parameter **angle offset** may be used to specify the offset of an azimuth towards the first interfering cell with regard to the x-axis, as seen from the centre cell.

During the multiple link generation, the **intersite distance** parameter (0.433 km in the example), in combination with the specified initial **offset angle**, will overwrite the original coordinates (Delta X/Delta Y) in the Vr-It path tab setting of the Interfering links.



**Figure 10: Example where 1 tier is used to position 4 interferers in a square shape (i.e. corners of a building) with the Vr positioned outside the square.**

## 2.4 Examples

The following presents two examples of the Relative position of the center interfering transmitter with respect to either Wt (Figure 11) or Vr (Figure 12).

**Relative to Wt**

Victim link: Vr (1,-2) from Wt	Interfering link: It (2.5,1.5) from the Wt
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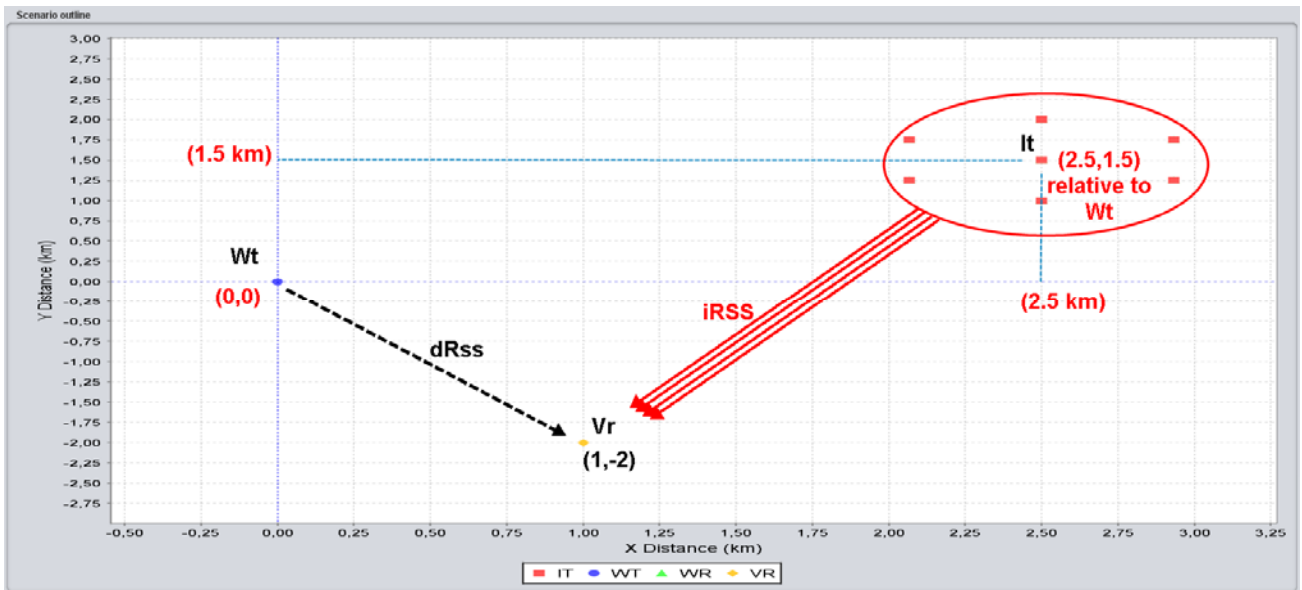


Figure 11: Example where the Its are set relative to the Wt.

**Relative to Vr**

Victim link: Vr (1,-2) from Wt	Interfering link: It (2.5,1.5) from the Vr
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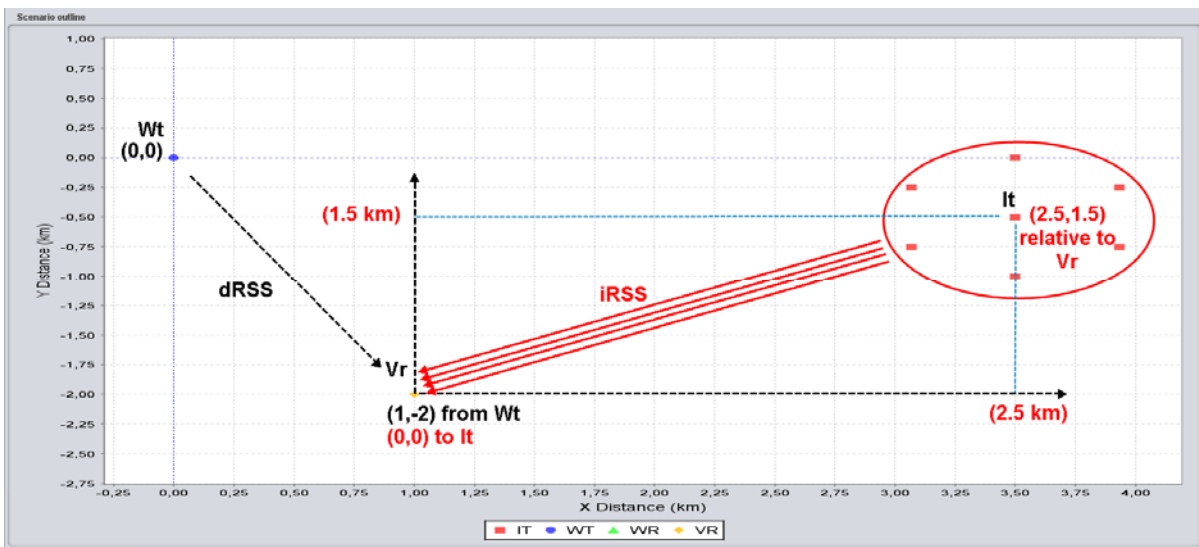
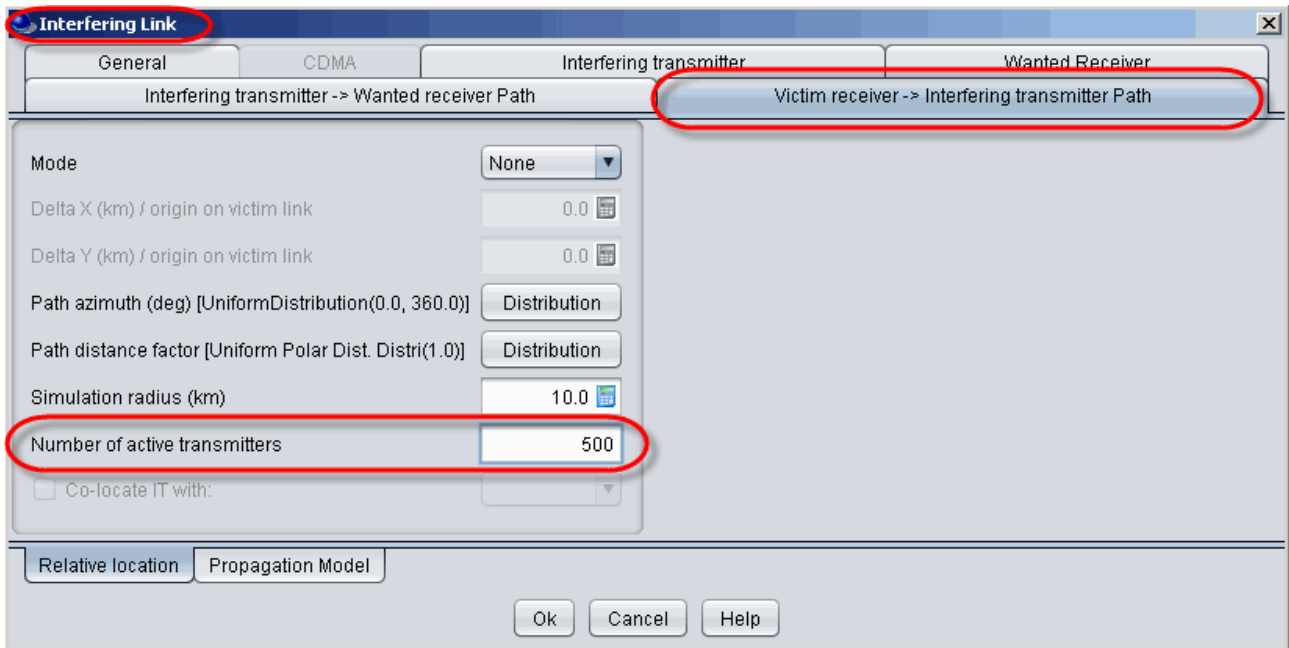


Figure 12: Example where the Its are set relative to the Vr.

### 3 OPTION 3

SEAMCAT allows defining of the number of active interfering transmitters as shown in Figure 13. These active transmitters have the same technical characteristics (i.e. duplicate) and they are deployed according to the mode selected. The iRSS result is stored as one vector (of size number of snapshots) where for each snapshot the iRSS value is the sum of the X active transmitters.

**Note:** The number of active transmitters is directly used to compute the simulation radius.



**Figure 13: Generation of multiple interferers with the same characteristics and using a specific deployment mode.**