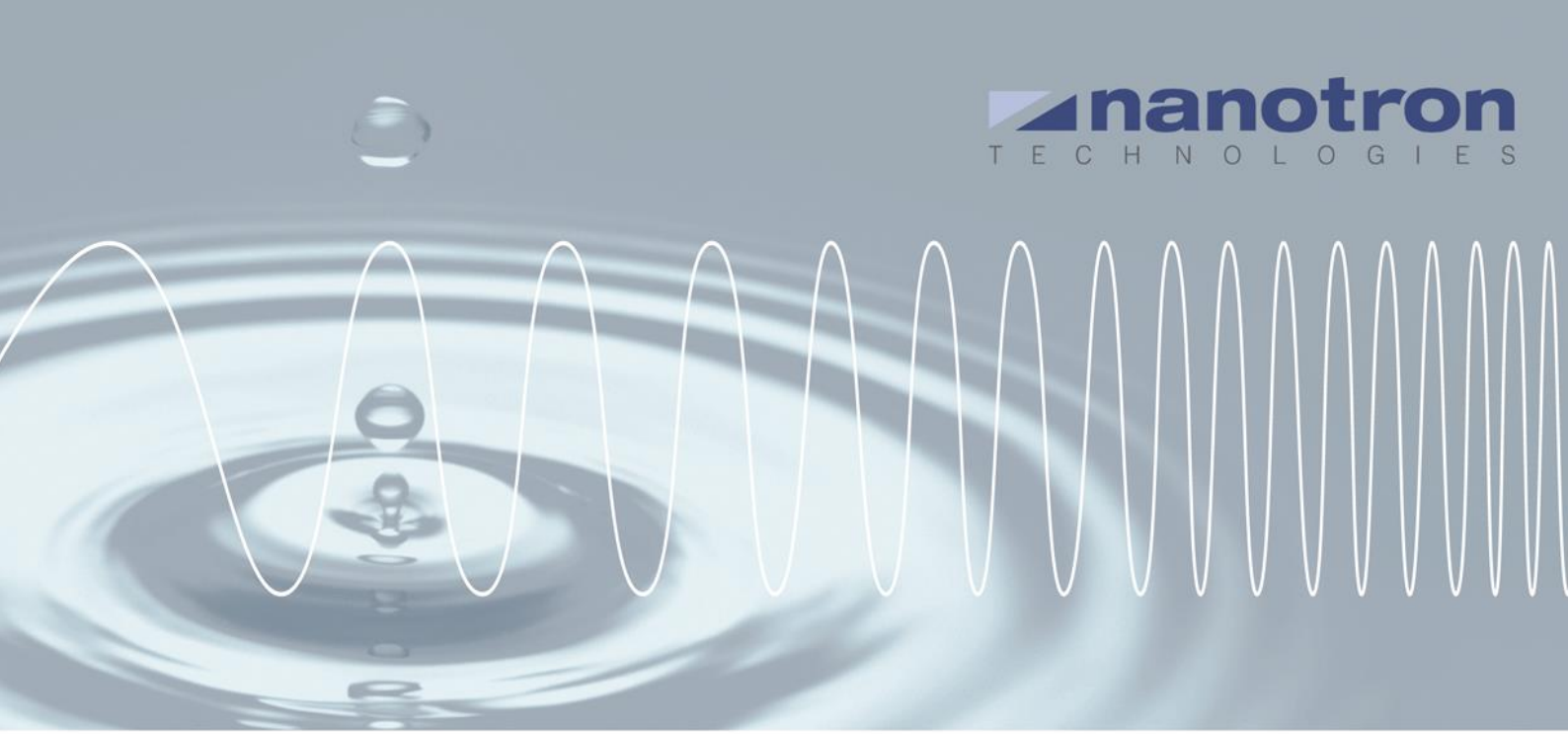

AN0603 - nanoLES 3: Basics to define sections

0.1

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Contents

1. Introduction

One of the great features added in nanoLES 3 is the possibility of doing location in different areas of a site and keeping the positioning in each area independent from the others. This capability allows the user to, using only one server, carry out for instance 3D location in a factory hall, while doing only presence detection in the offices area attached to it.

nanoLES 3 implements this feature through the definition of multiple sections. All the details regarding sections and their all their parameters are described in [1]. The goal of this document is to show the user the basics to start, fast and easily, playing with sections. Once this is done we recommend to check the [1] to understand all the parameters concerning section in order to boost the performance of nanoLES 3.

2. What is a section?

A section is a specific area where it is required to perform tag location. The basic parameters defining a section are:

- Anchors/antennas belonging to that section: as each antenna of an anchor can be defined independent from the other, it is possible that one antenna belongs to one section, and the other antenna to another section.
- Location Dimensions: 1D, 2D, 3D or 0D (presence detection)
- Boundaries

By default all the other parameters are defined globally for all the sections. The user can change the value of these global parameters or define them locally for each section. When no local parameters are defined for one section nanoLES utilizes the global ones.

3. How to define sections

3.1. Preliminary requirements

Before the user can start defining sections all the anchors that will be used should be defined and the coordinates (x, y and z) should be given. This can be done following the same coordinate system for all the anchors (global coordinates) or using a different coordinate system for each group of anchors defining a section (local coordinates). It is important to note that all the anchors in one section should follow the same coordinate system.

3.2. 0D sections (presence detection)

When doing presence detection nanoLES notifies what tags are detected in that section, but it does not estimate their positions. In consequence it is enough if the section consist of only one anchor.

The parameters that should be specified are:

Anchors (and antennas): anchor A1, …, anchor An
Dimensions: 0
Minimum number of anchors: 1

All the other section relevant parameters are globally defined with, initially, their default values. If they are not locally defined inside the section nanoLES 3 will use the global values.

Note: when doing 0D location, as no position is estimated, the tag is not represented in visitool.

3.3. 1D sections

1D sections can be defined in two different ways depending on the application requirements.

3.3.1. Traditional 1D section

Often, when working in big sites with multiple sections, and 1D sections, it is not important to now the absolute position of the tag but the position only relative to that section. For instance, if we are working in a big offices building we do not need to know the absolute position. We are only interested in knowing in which corridor the tag is and at what level (how far from the beginning of the corridor). In these cases the traditional 1D sections should be used.

Traditional 1D sections only require x coordinates, **y and z should be equal to 0**. This often implies the use of local coordinates. The easiest way to manage this is by giving the coordinate x=0 to the first anchor in the section, Anchor A1, and for the rest, An, assigning them x equal to the distance from An to A1.

Although the anchors should be placed forming a line, in reality this is not always possible. Thus the tag will always be positioned on the line that best fits all the anchor positions. Figure 3-1 depicts a 1D section consisting of anchors from A1 to A5 and the tag, T, moving along the line that best fit the position of all anchors.

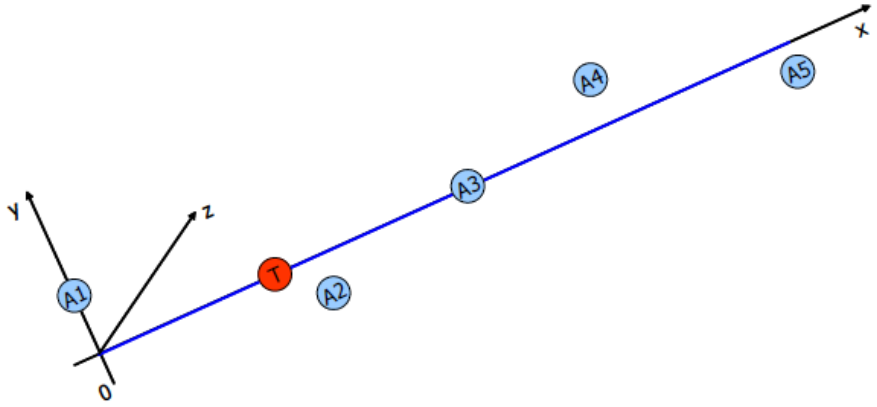

Figure 3-1 Typical 1D section

When RF reception is only possible along the x direction. The section can also describe a non-rectilinear form. Figure 3-2 shows a section in which the reception can only happen along the x coordinate, for instance a tunnel in a mine. In this case the x coordinate of each anchor can be given as the measured distance to anchor A1 and the trajectory of the tag will follow the shape of the tunnel.

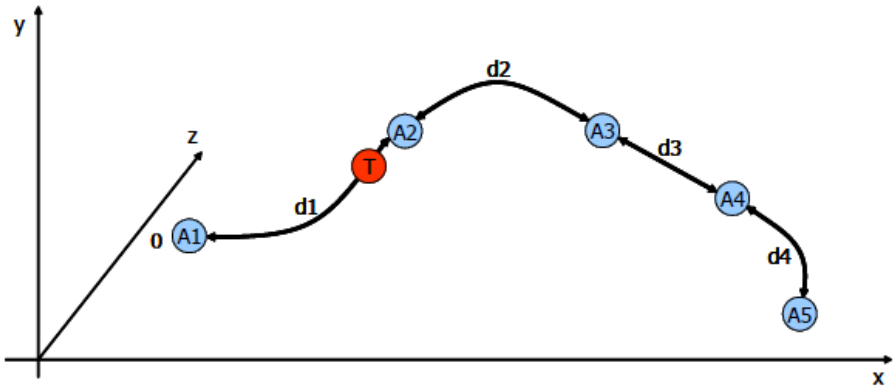

Figure 3-2 1D section in which a RF detection is posible along the trajectory described by the anchors

The parameters that should be specified for a traditional 1D section are:

Anchors (and antennas): anchor A1, anchor A2, …, anchor An
Dimensions: 2
Minimum number of contributing anchors: 2
Anchor A1: x = 0 (local coordinates), y=0, z=0
Anchor A2: x = distance from A2 to A1 (local coordinates), y=0, z=0
…
Anchor An: x = distance from An to A1, y=0, z=0

All other section relevant parameters are globally defined with, initially, their default values. If they are not locally defined inside the section nanoLES 3 will use the global values.

3.3.2. 1D section as an underdetermined 2D section

Sometimes the tag describes a 1D trajectory but for some reason it is interesting to know its absolute position, to locate it in reference to the complete system. In this case we should understand 1D location as the location of the tag along a certain axis; however, this axis (or straight line) can be defined in 2D

coordinates. The result will be estimated position, with x and y coordinates, that will be always located on the straight line defined by the anchors.

To set up this kind of location it is necessary to define the section as 2D but with a minimum number of anchors detecting equal to 2. This will force nanoLES 3 to work even though the data is not enough to estimate a 2D position. For this reason it will only be able to estimate a position on the line defined by the anchors. Figure 3-3 shows a typical 2D underdetermined section. The three anchors, A1, A2 and A3 are aligned and the tag, T, moves along the axis described by the anchors. The better aligned the anchors are, the better the results will be.

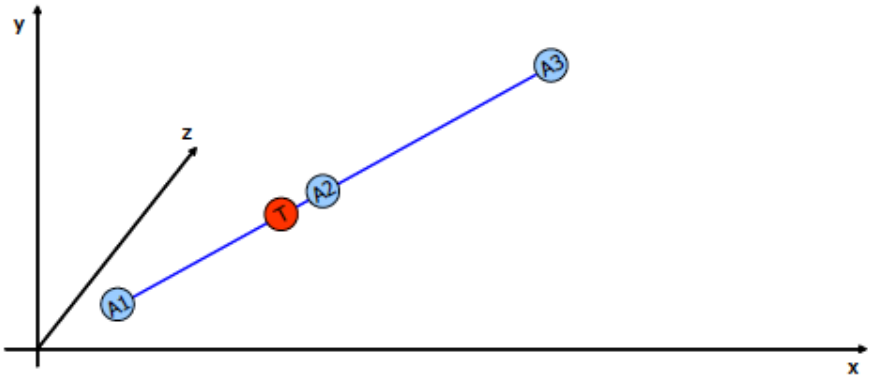

Figure 3-3 Typical 2D underdetermined section

The parameters that should be specified for a traditional 1D section defined as a 2D underdetermined section are:

Anchors (and antennas): anchor A1, anchor A2, …, anchor An
Dimensions: 2
Minimum number of contributing anchors: 2

For this type of location it is possible to use global coordinates or, if local coordinates are preferred, both the x and y coordinates should be declared.

All other section relevant parameters are globally defined with, initially, their default values. If they are not locally defined inside the section nanoLES 3 will use the global values.

3.4. 2D sections

The anchors should be placed around the area in which localization should be done.

In order to estimate a 2D position nanoLES 3 needs that at least 3 anchors detect the tag..

The parameters that should be specified are:

Anchors (and antennas): anchor A1, anchor A2, anchor A3, …, anchor An
Dimensions: 2
Minimum number of contributing anchors: 4

All other section relevant parameters are globally defined with, initially, their default values. If they are not locally defined inside the section nanoLES 3 will use the global values.

3.5. 3D sections

The anchors should be placed around the area in which localization should be done.

In order to estimate a 3D position nanoLES 3 needs that at least 4 anchors detect the tag..

The parameters that should be specified are:

Anchors (and antennas): anchor A1, anchor A2, anchor A3, anchor A4, …, anchor An
Dimensions: 3
Minimum number of contributing anchors: 5

All other section relevant parameters are globally defined with, initially, their default values. If they are not locally defined inside the section nanoLES 3 will use the global values.

4. References

[1] nanoLES 3 User Guide v1.5, NA-13-0243-0043-1.5, nanotron Technologies

Document History

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10-8-16	MLA	1.0	Preliminary version

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Further Information

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