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# Buildings Aware Path Loss Modeling in ns-3


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ONERA - ENAC

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# 0. Introduction

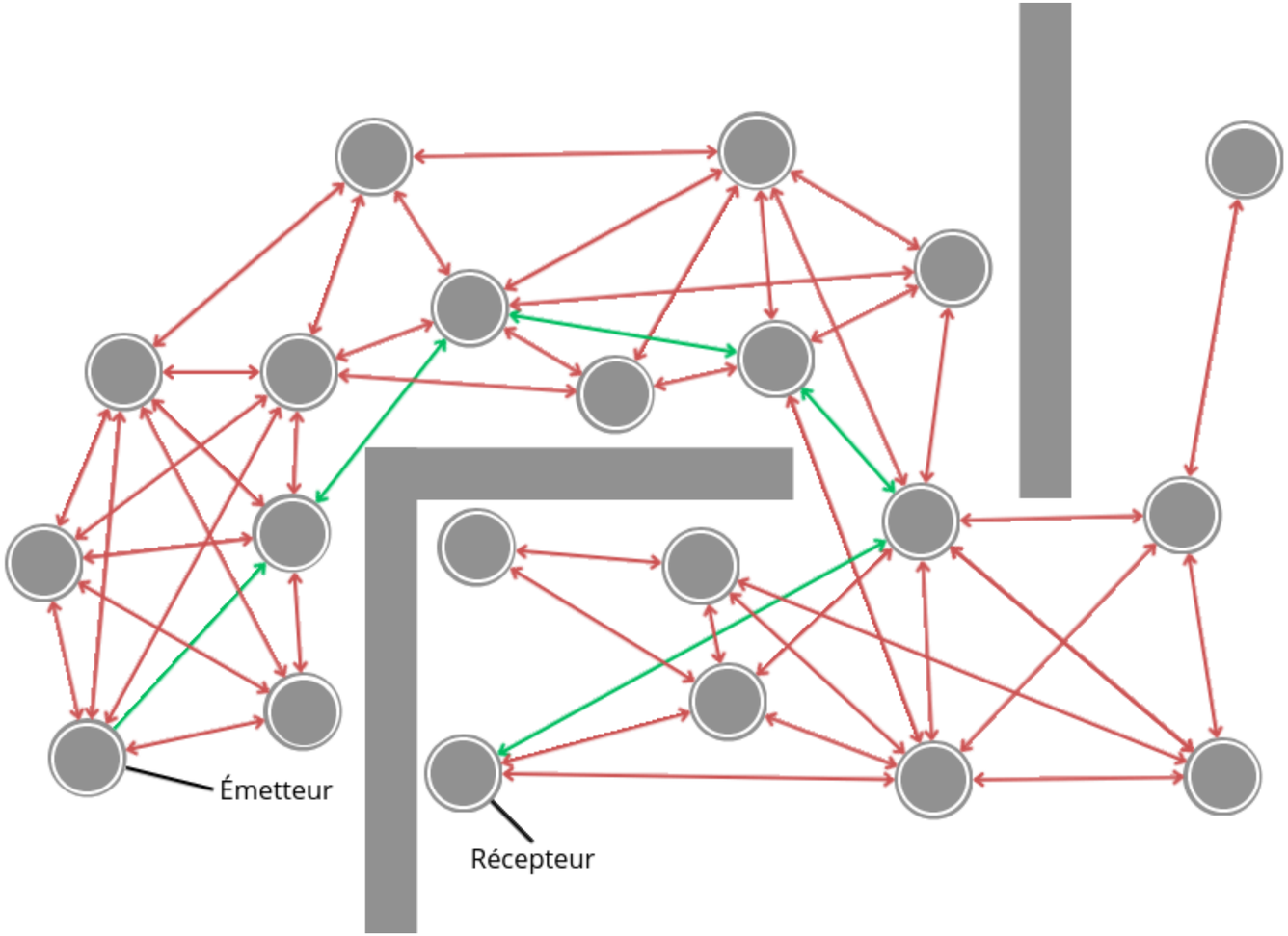


Figure 1 : Visualization of available path and used path in the routing process

# 0. Introduction

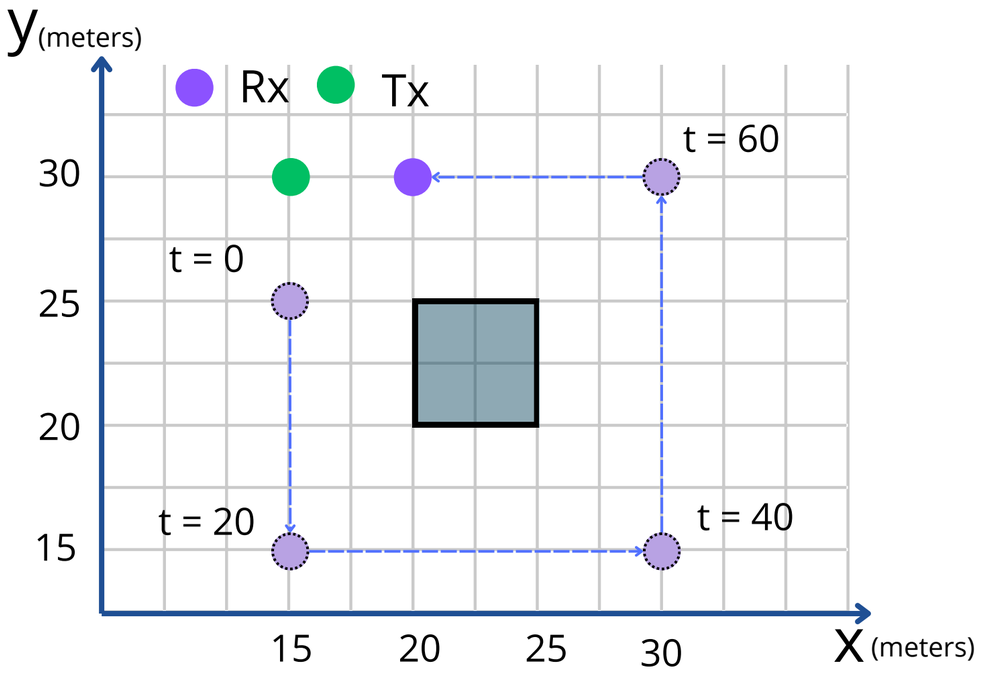


Figure 2 : Visualization of a mobility scenario

# 0. Introduction

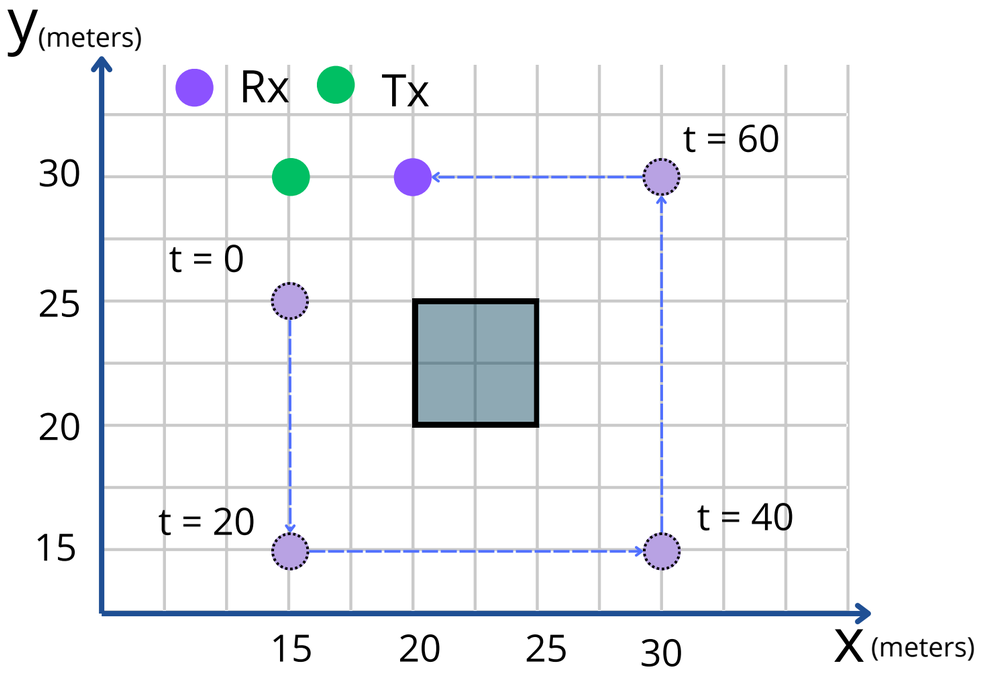


Figure 2 : Visualization of a mobility scenario

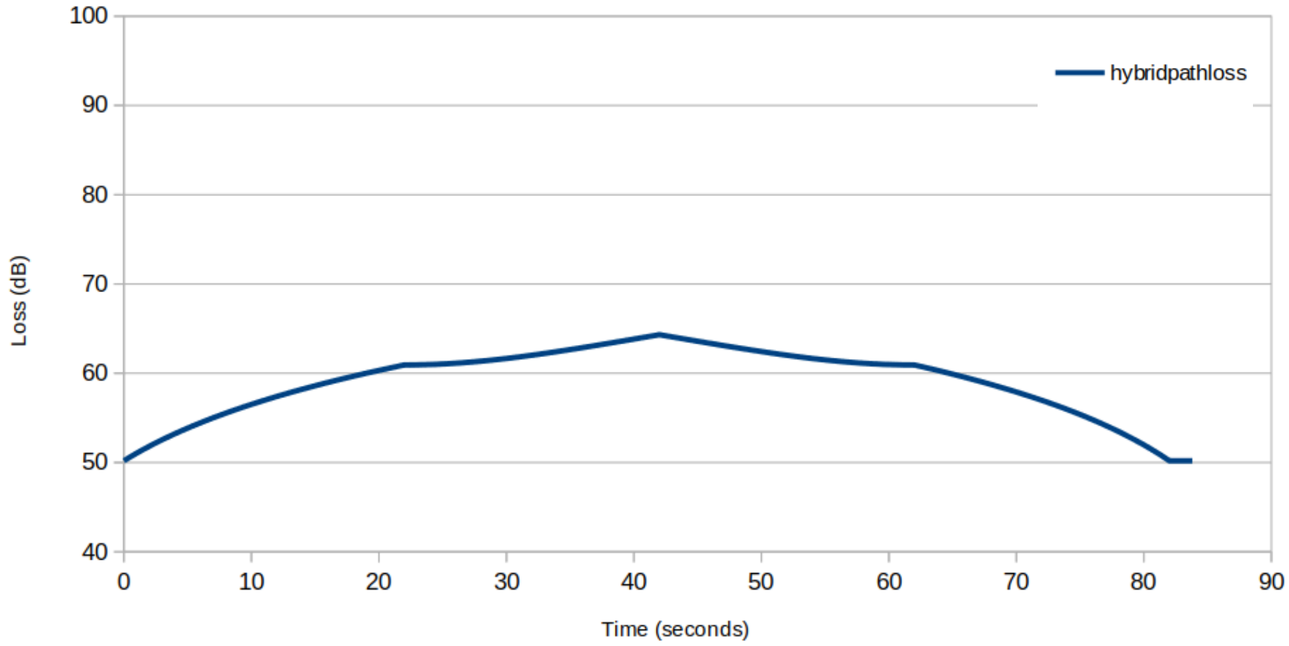


Figure 3 : Loss value as function of the time

# Summary

0. Introduction
1. ns-3, signal propagation and path loss modeling
2. Developed loss model
3. Implementation
4. Results

# ns-3, signal propagation and path loss modeling

## Signal propagation

- Decrease with the distance
- Obstacles may interfere with the strength of the signal

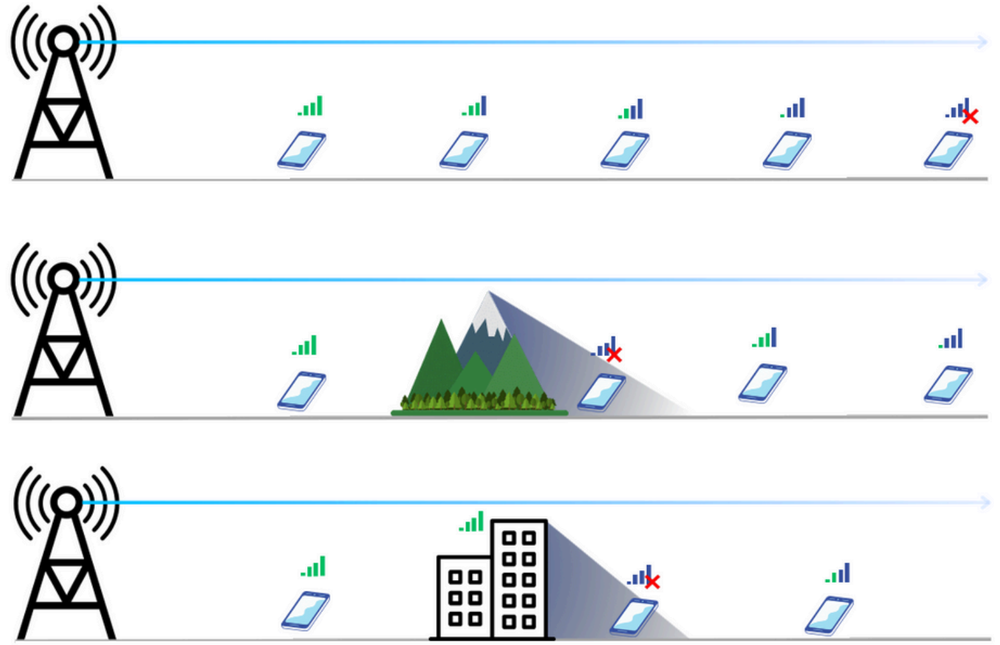

Figure 4 : Visual representation signal strength in multiple settings

## ns-3

- Network simulator
- Discrete time events
- Open-Source
- Modular architecture
- Most used in scientific community
- Very scalable

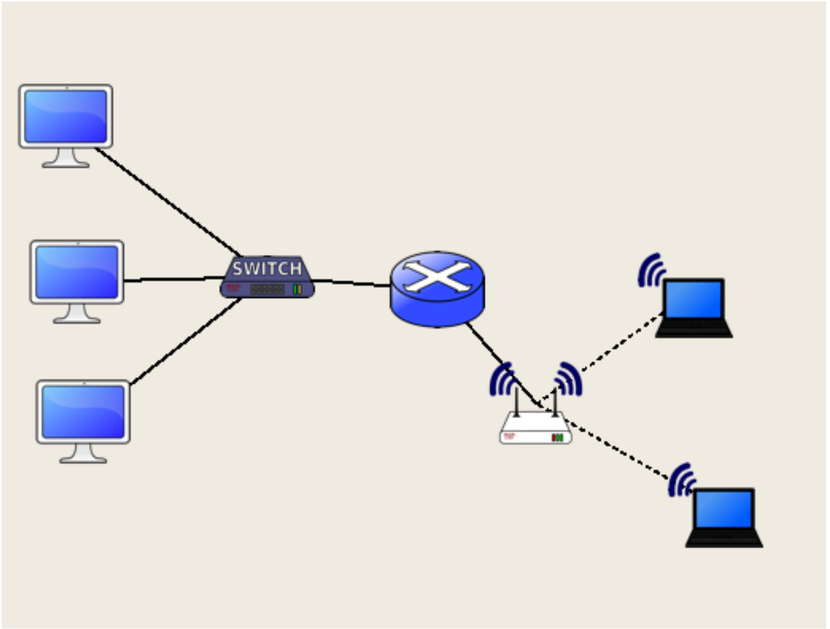


Figure 5 : Visual representation of a network scenario in ns-3

# Path loss modeling

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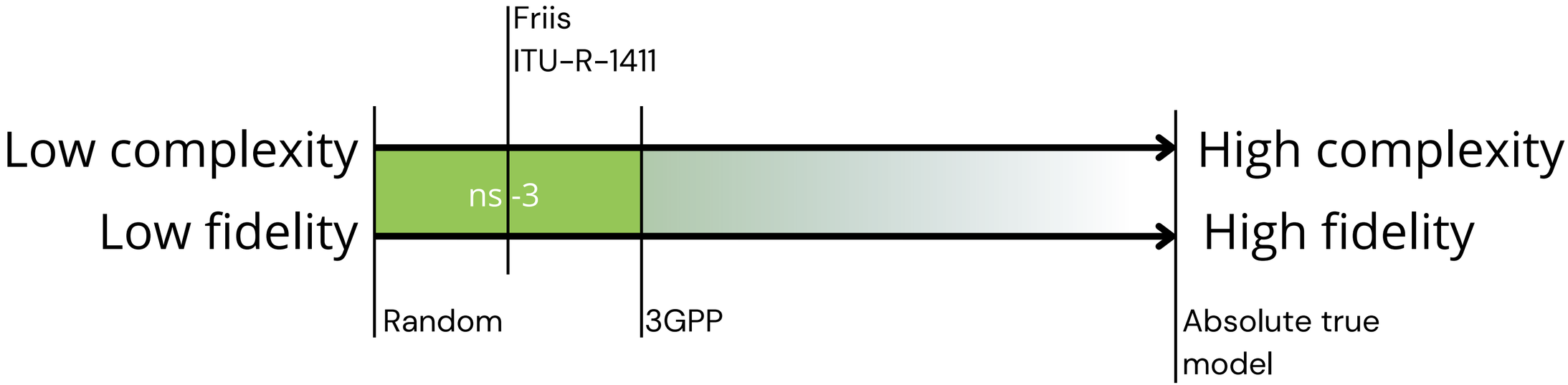
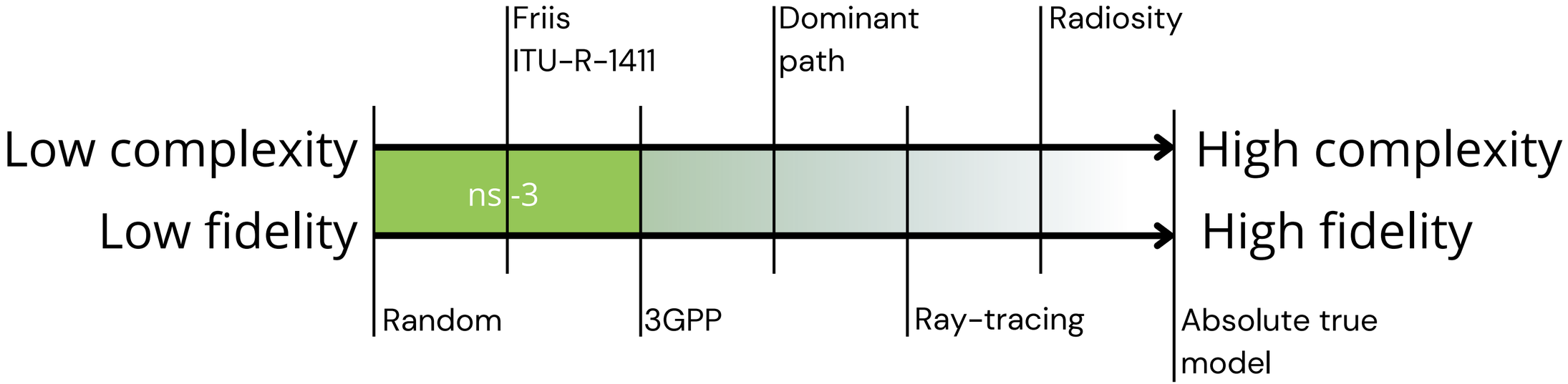


## Path loss modeling



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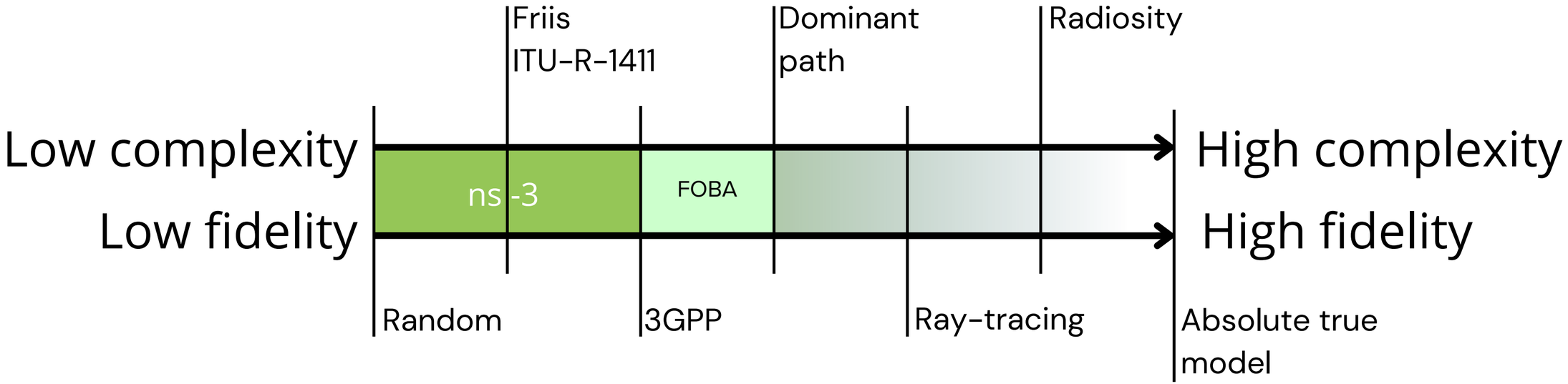



Figure 6 : Visual mapping of the different loss model approaches

## Path loss modeling

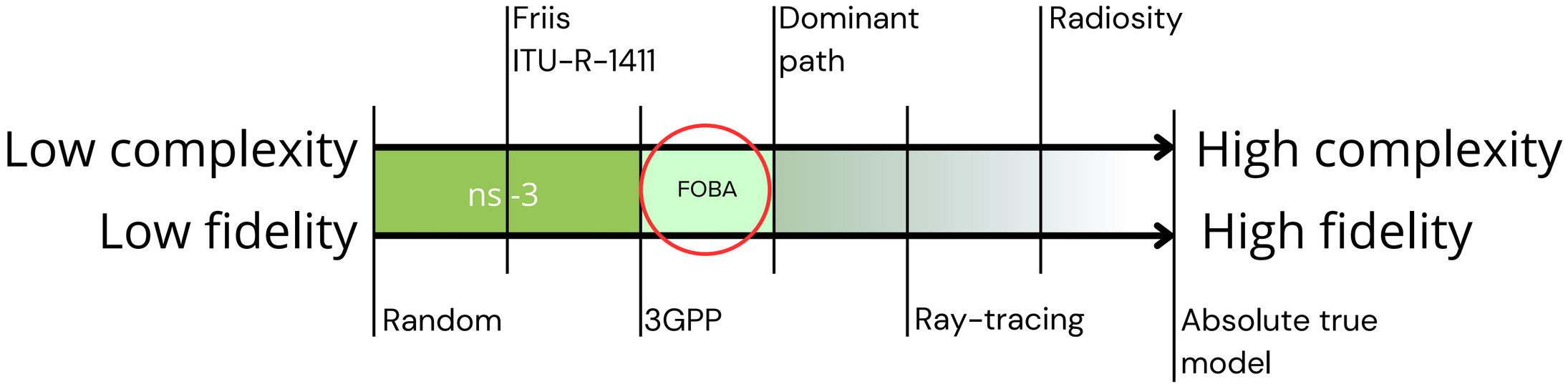



Figure 6 : Visual mapping of the different loss model approaches

# Developed loss model

## Dominant path model

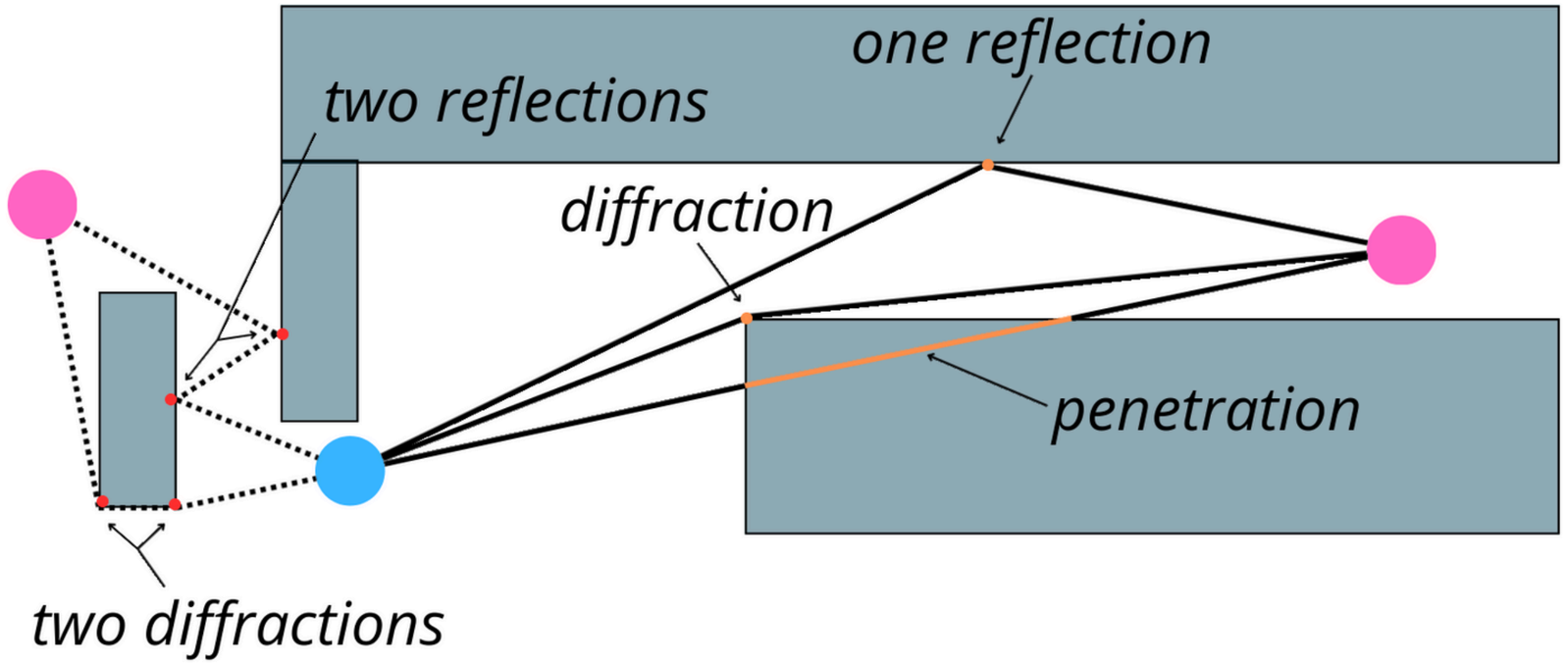



Figure 7 : The dominant path method where the signal, considered as a ray, interacts with the object in the medium (penetration, diffraction, reflection).

## Dominant path model

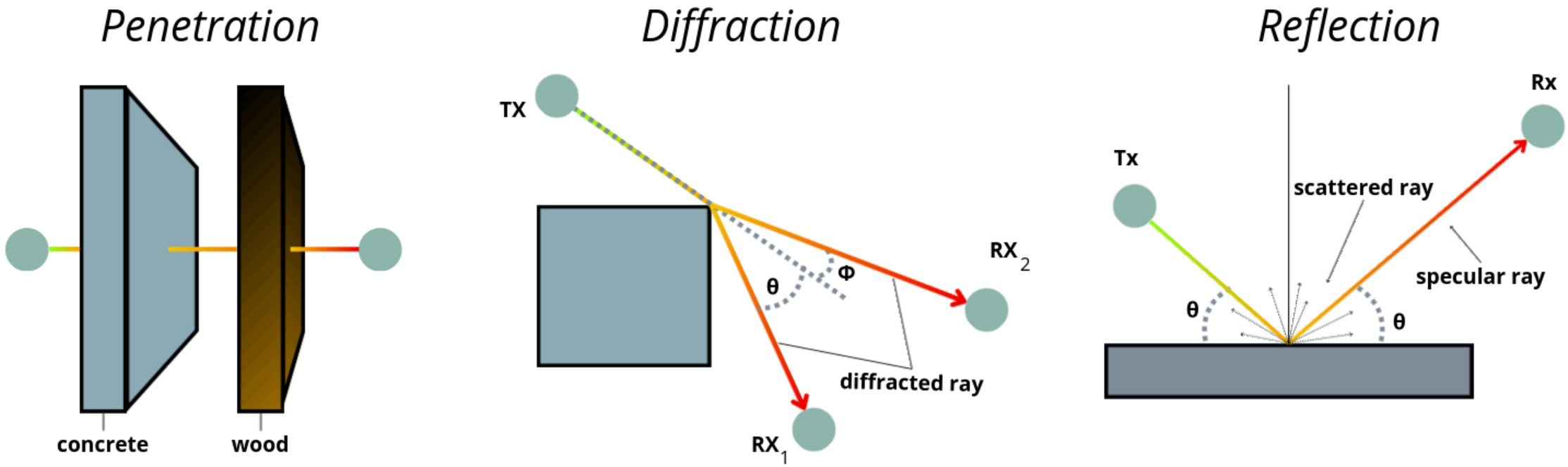



Figure 8 : Visual representation of signal penetration, diffraction and reflection on objects.

# Implementation

# 3. Implementation

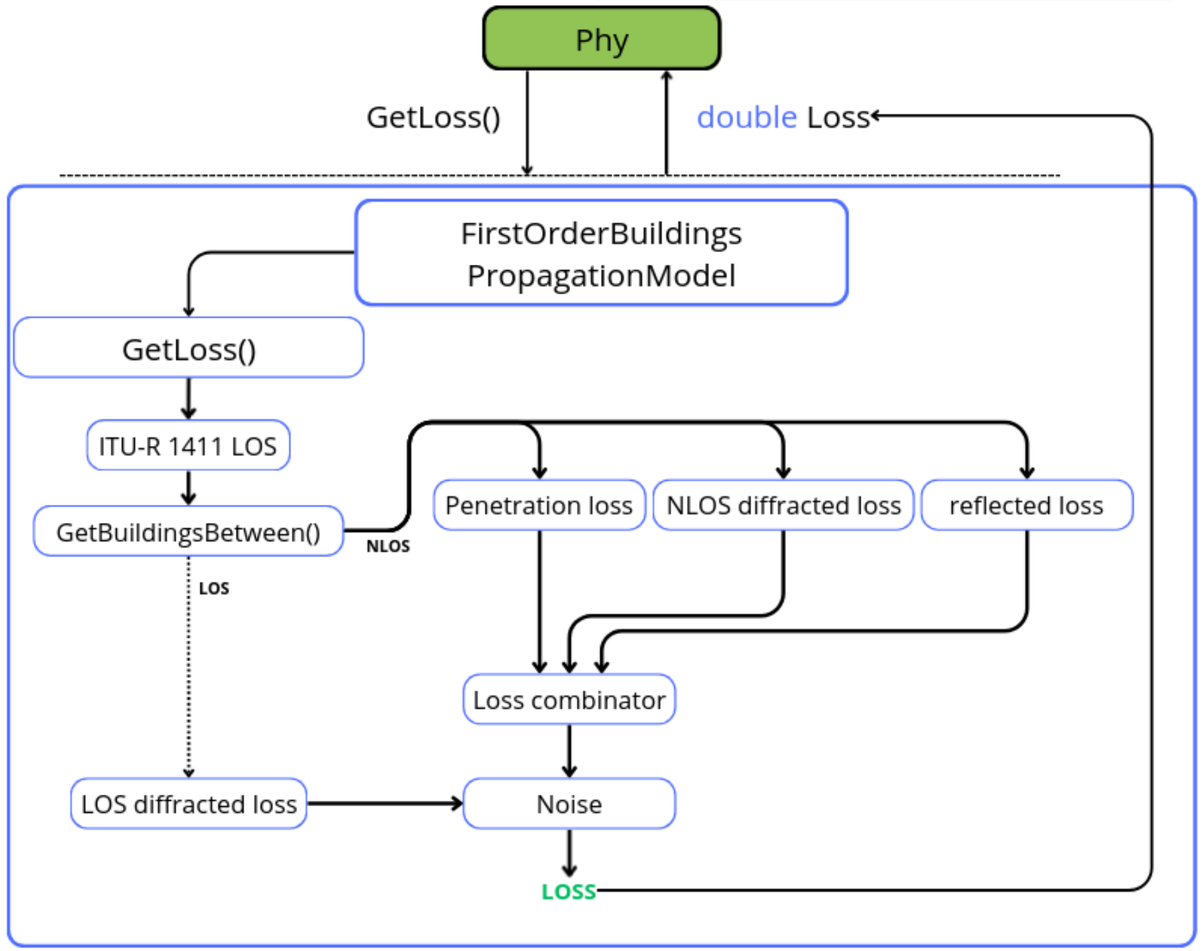



Figure 9 : Code architecture

# Results

# First scenario

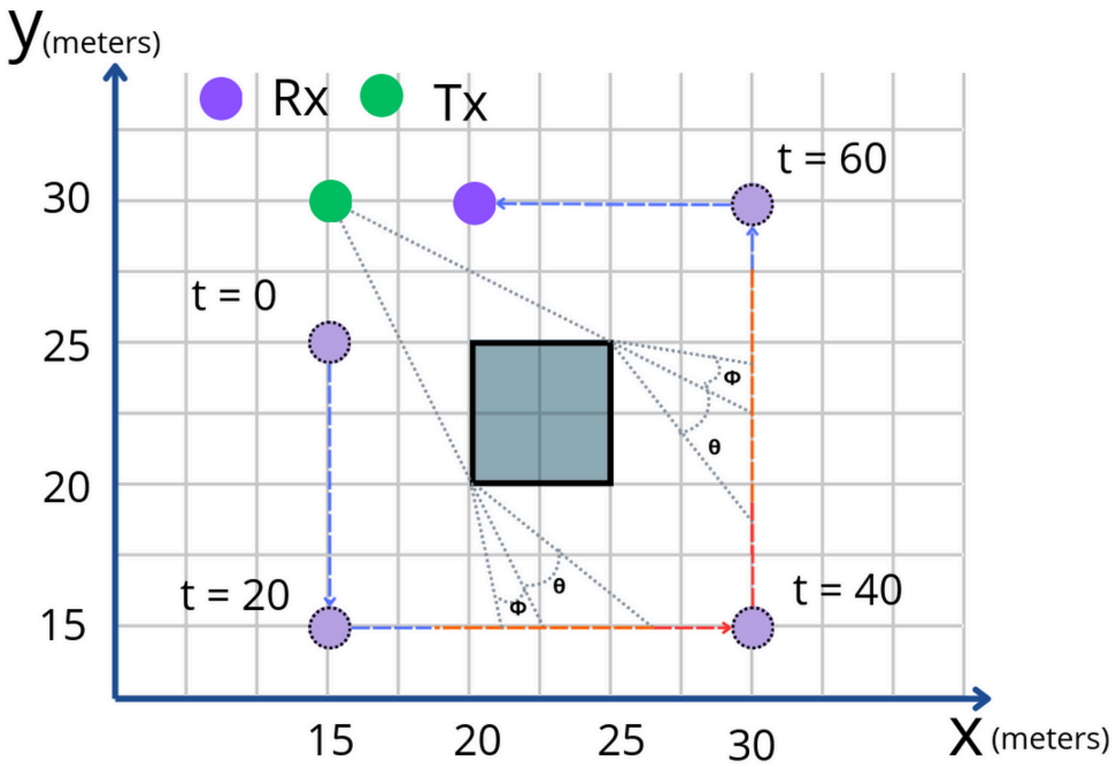



Figure 10 : Visualization of the first scenario

# First scenario

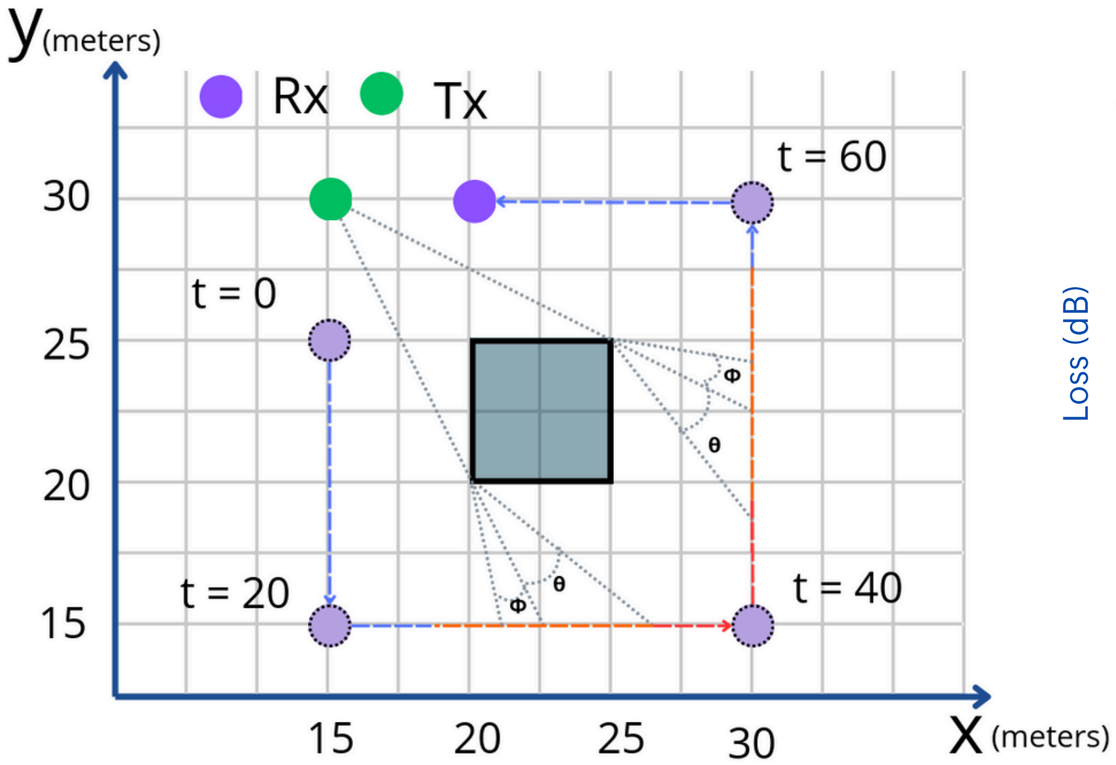



Figure 10 : Visualization of the first scenario

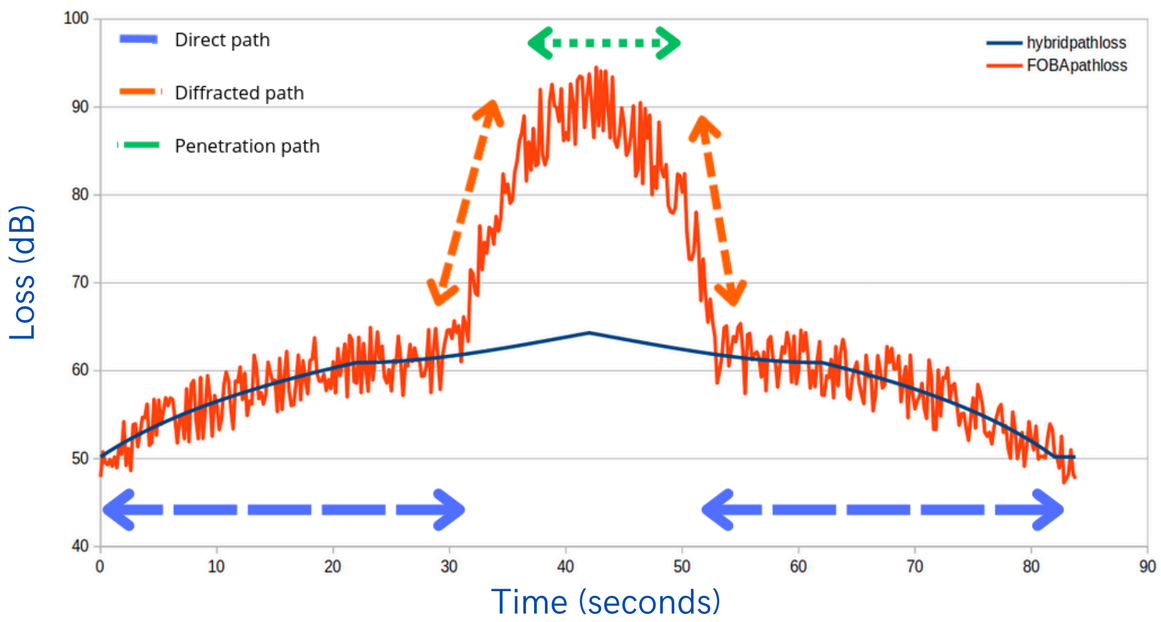



Figure 11 : Loss value as function of the time

# Performance tests

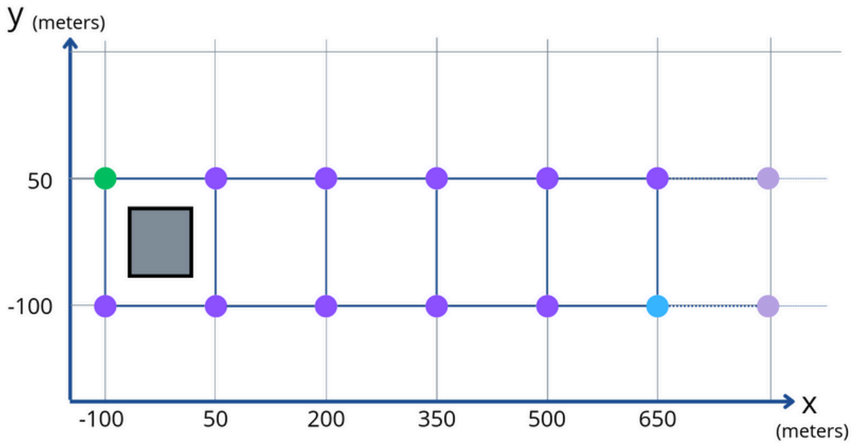
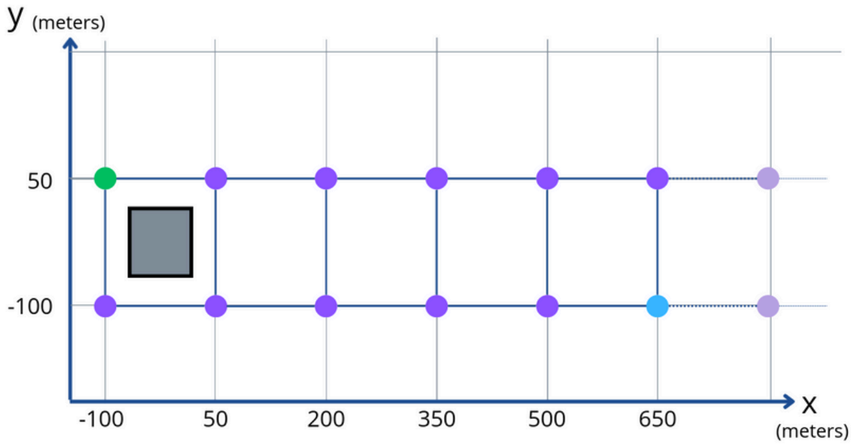
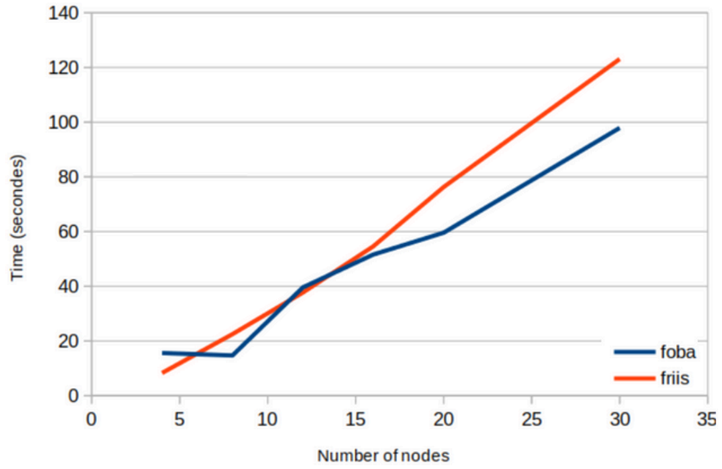



Figure 12 : Performance tests

# Performance tests

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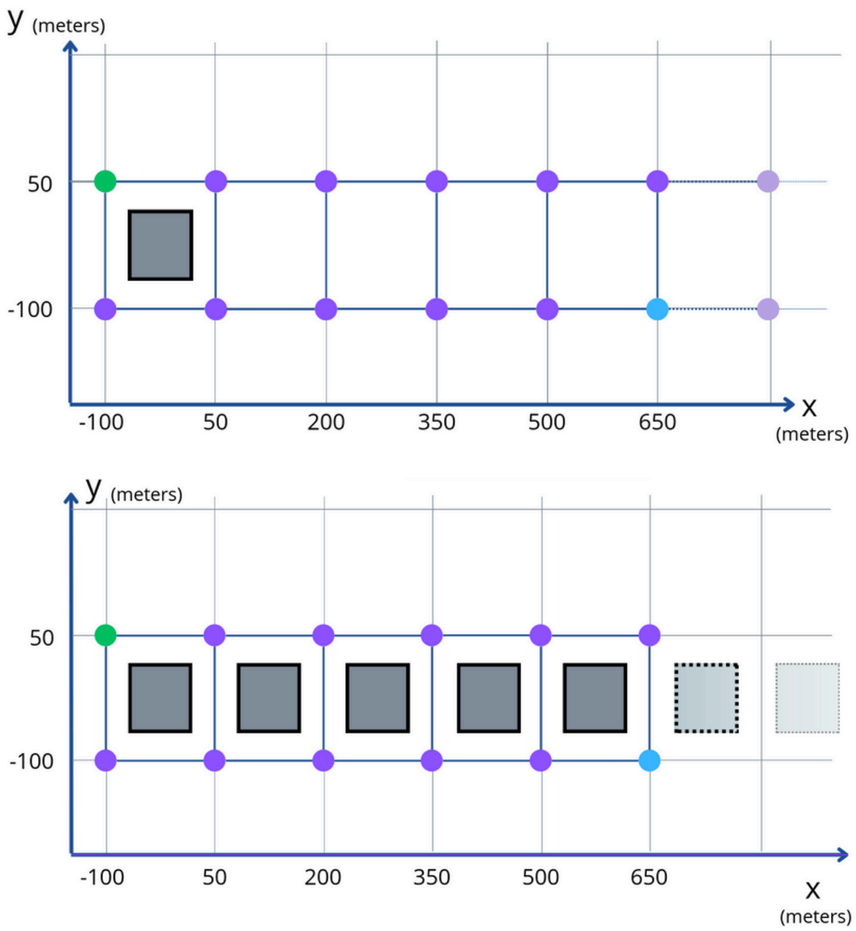


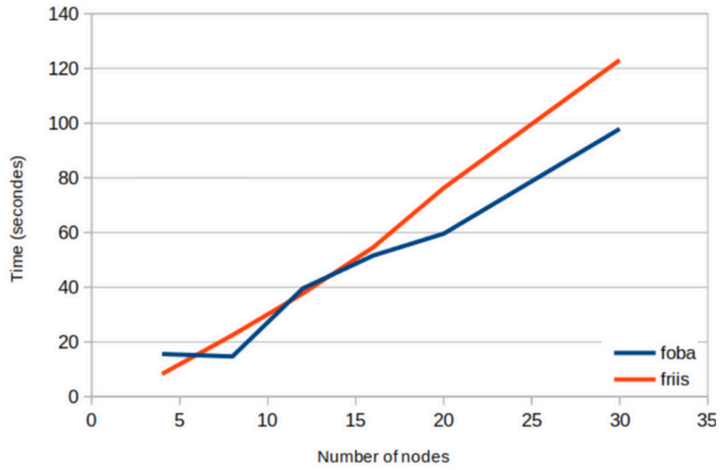


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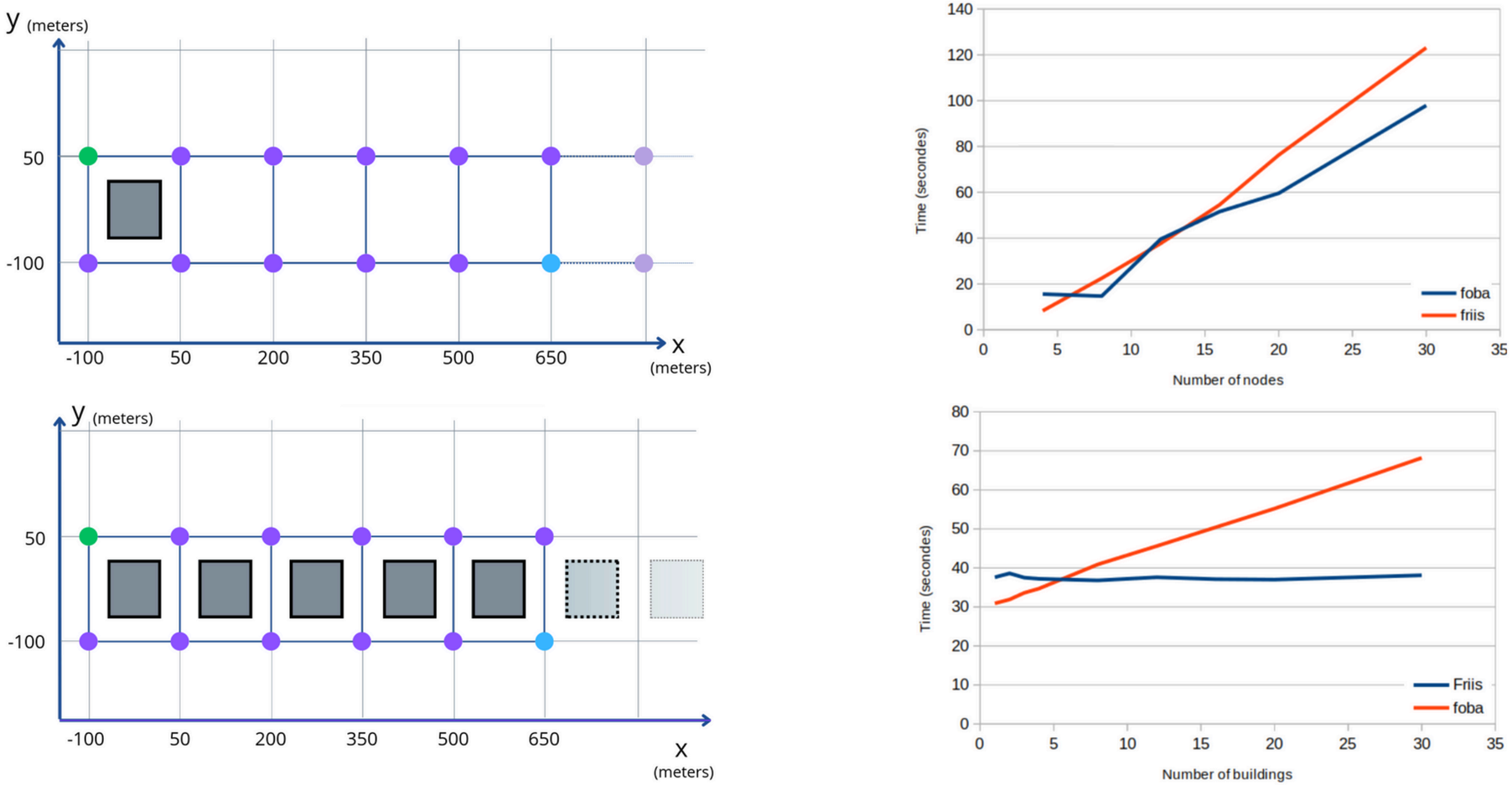


Figure 12 : Performance tests

- **Currently under review for ns-3 integration**
- **Submission to International Conference on ns-3 (ICNS3),** formerly known as Workshop on ns-3 (WNS3)

# Thank you for your attention