



Project Plan

Project: *Fading illustration with SDR*

Version 0.1

Changelog

Date	Version	Author	Description
2021-09-21	0.1	Pross N.	Created document
2021-09-23	0.2	Pross N., Halter S.	Created Project Plan
2021-09-23	0.3	Halter S.	First Task description
2021-09-25	0.4	Pross N.	Updated introduction, task description and described timeline

Date

Signature

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1 Introduction

For the semester thesis at the University of Applied Sciences Eastern Switzerland (OST) it has been requested to create a demonstrative setup to show the fading effect, which is present in real world wireless communication systems. The device is intended to be used for pedagogical purposes such as to show the effect at the Open Days or for demonstrations during future lectures on fading channels.

2 Task Description

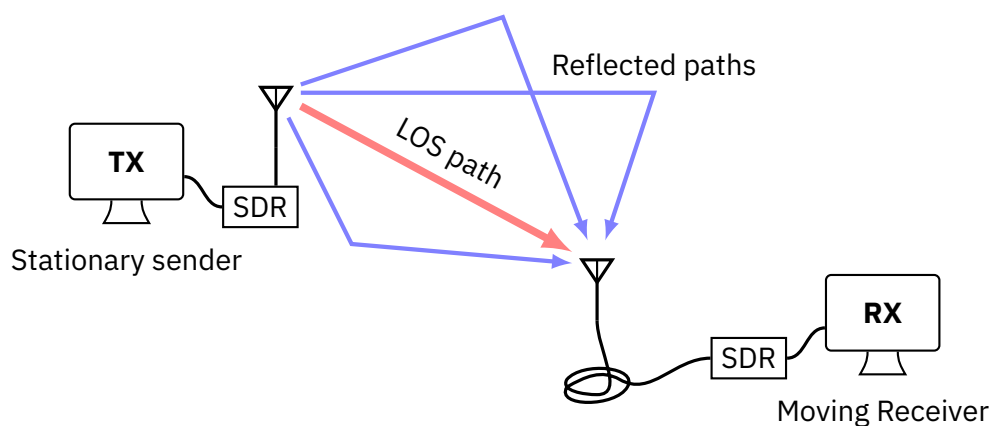


Figure 1: Sketch of the setup that will be modelled and implemented. The model will need to be adjusted depending on whether there is a line of sight (LOS) between the sender and receiver. For both devices a software defined radio will be used, which means that the “movable” part of the receiver will probably be just the antenna.

The scope of the project is to realize a demonstration of a fading channel using a software defined radio (SDR). Out of the many types of fading effects that exist only small scale fading effects ought to be shown in the demonstration, specifically multi path propagation fading is of interest. The project requirements that must be fulfilled are thus:

- Understand of one or more mathematical models of the fading effect.
- Evaluate a suitable development environment for the SDR.
- Develop of a signal processing chain for the SDR transmitter and receiver.
- Develop of an interface to vary the parameter of the transmission, such as the modulation scheme.
- The demonstration should work with both stationary and moving receivers.

3 Development plan

The development of the project will be carried out roughly in three phases, of which the first two will start in parallel.

1. Develop an understanding of fading and how to work with SDR devices.
2. Create a basic TX – RX line *without* a fading channel model.
3. Integrate the fading channel model into the prototype.

3.1 SDR Device

3.2 Prototype

3.3 Theory of fading channels

4 Milestones

Table 1: Milestones of the project

Name	Due date	Description
Project plan	Week 40	Finalization of this document.
Working SDR TX – RX	Week 44	Completion of an RX – TX line on SDR with variable parameters for configuration.
Working fading TX – RX	Week 49	Both the simulated and the physical transmission lines work and it is possible to observe the consequences of fading.
Documentation	Week 50	The documentation is complete both on the theory and practical sides.
Presentation	23 Dec. 2021	Presentation of the project on Campus.
Submission	24 Dec. 2021	–

Figure 2: Project schedule (Gantt diagram)

