WSN-based Indoor Localization System

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Outline

- Introduction
- Problem
- Background
- Solution
- Implementation
- Improvements

Introduction

Introduction

- Experiment (AHT)

- EDI testbed

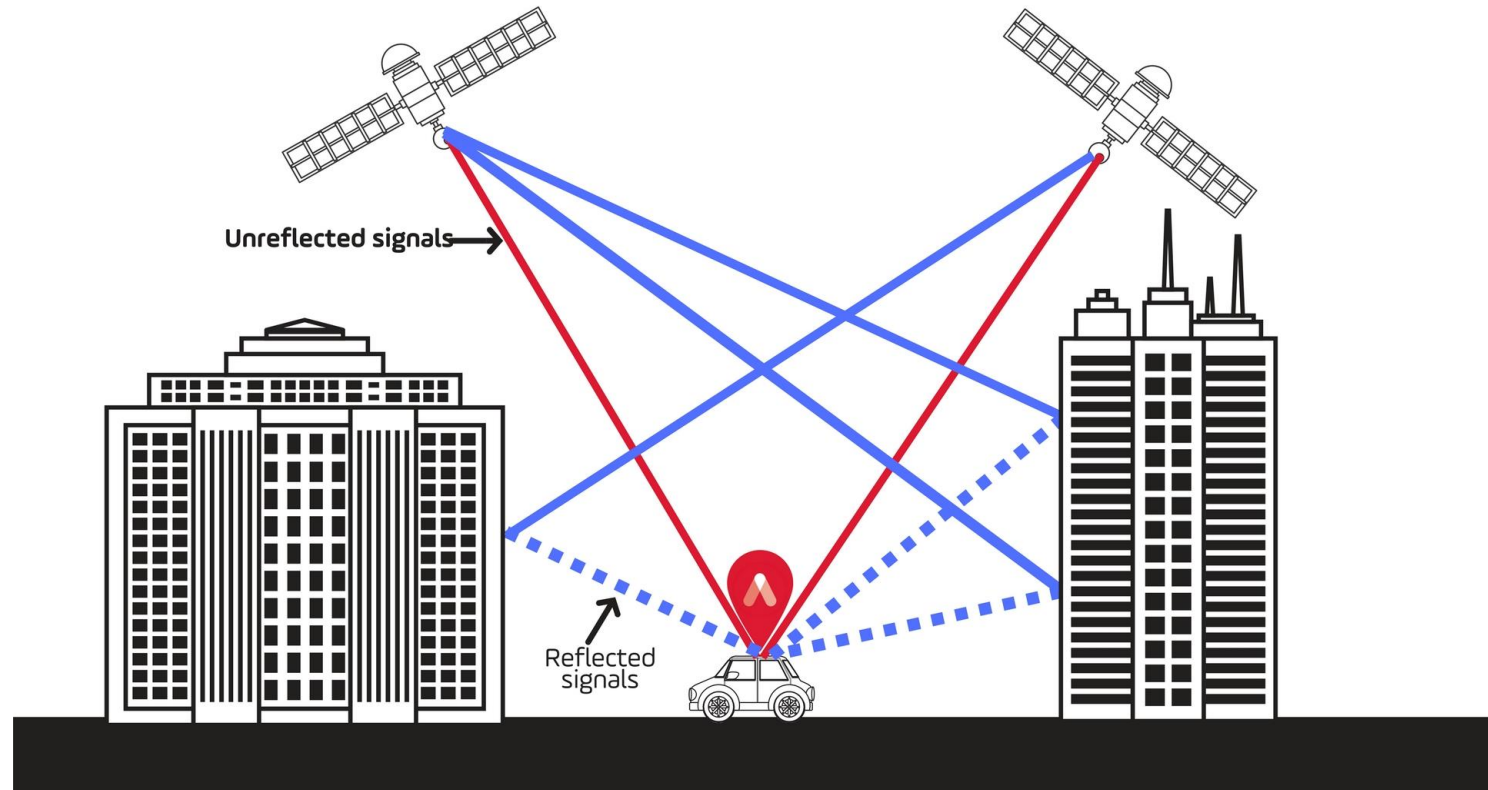- Improved accuracy of target localization (indoors)

Problem

Problem

- **GNSS/GPS**
  - Open space
  - Low accuracy
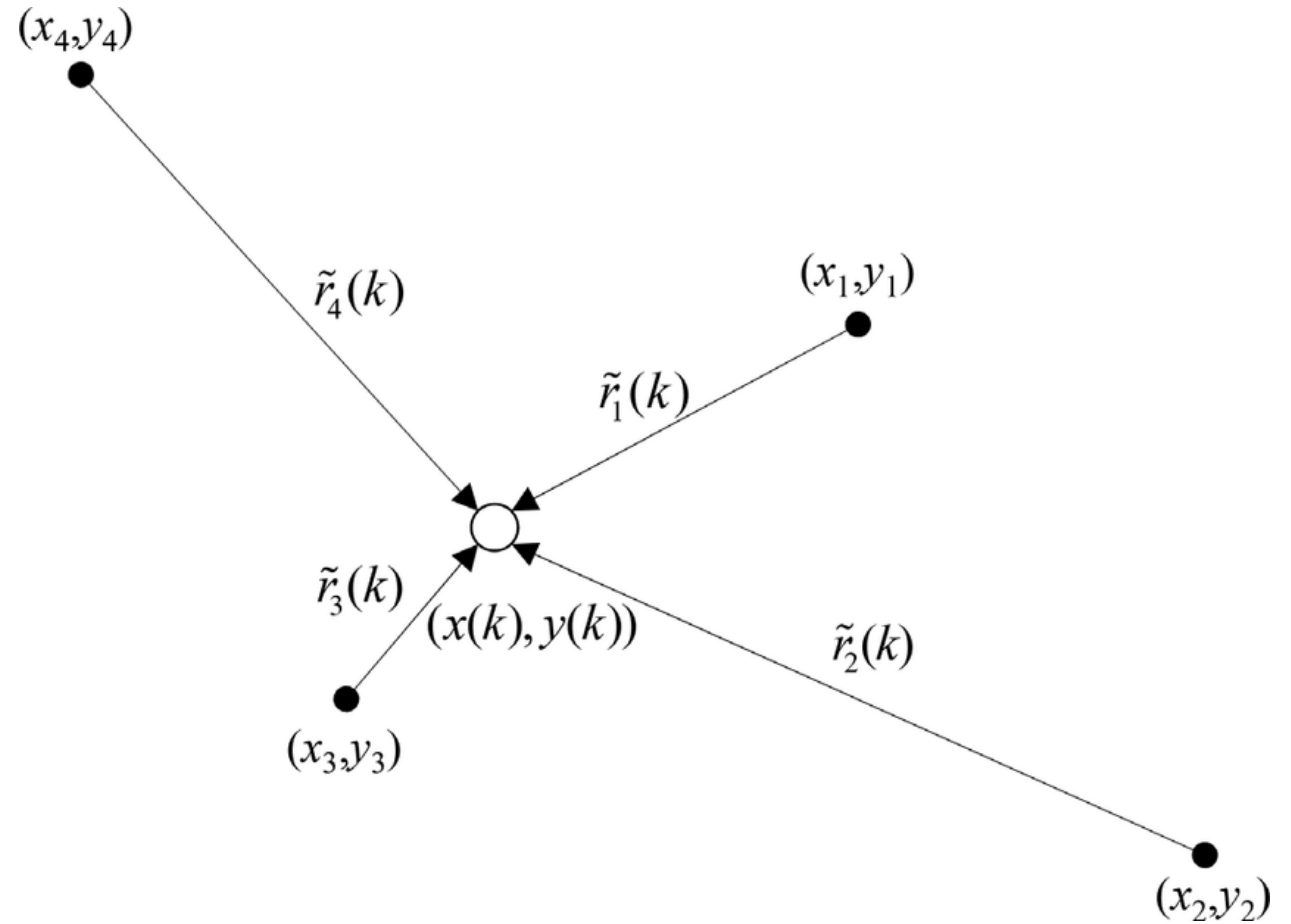 - RTK expensive

- **Indoors**
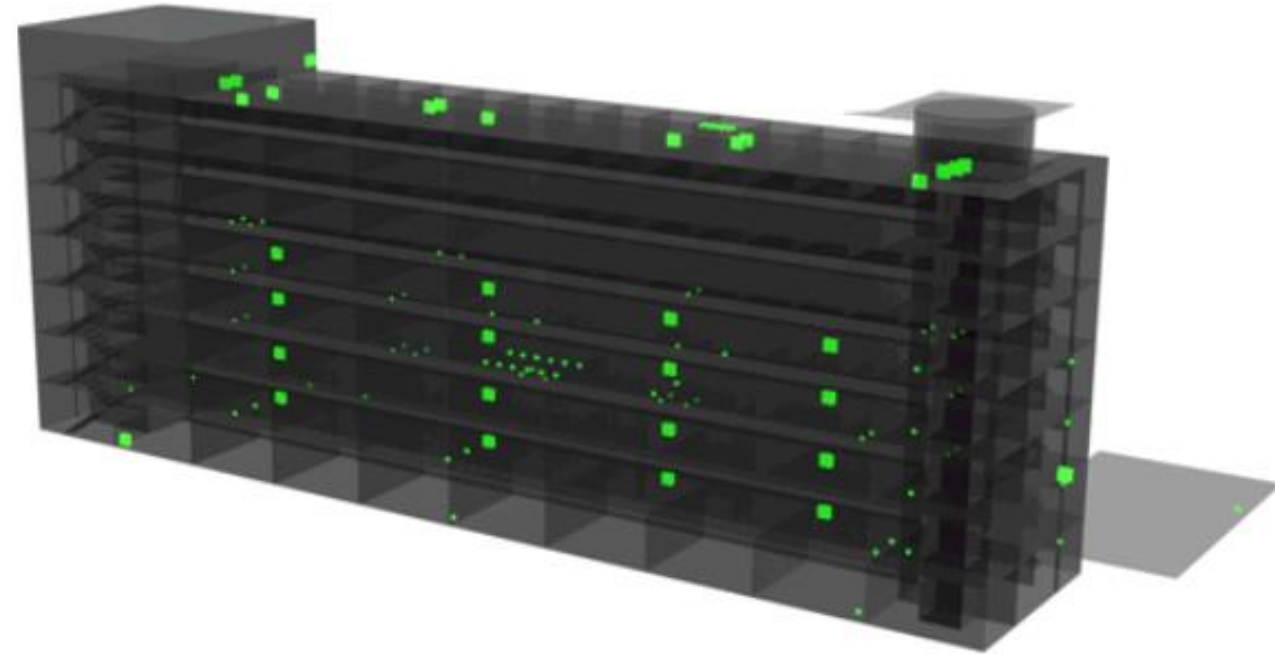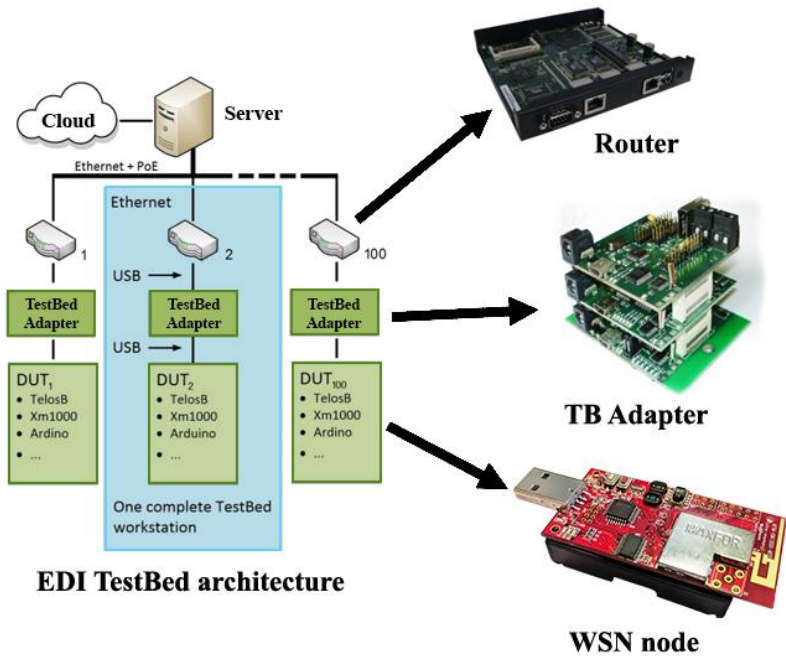 - Obstructions/barriers
  - High accuracy (cm)

Background

Background

- Absolute vs Relative

Background

- EDI testbed

EDI TestBed architecture

Router

TB Adapter

WSN node
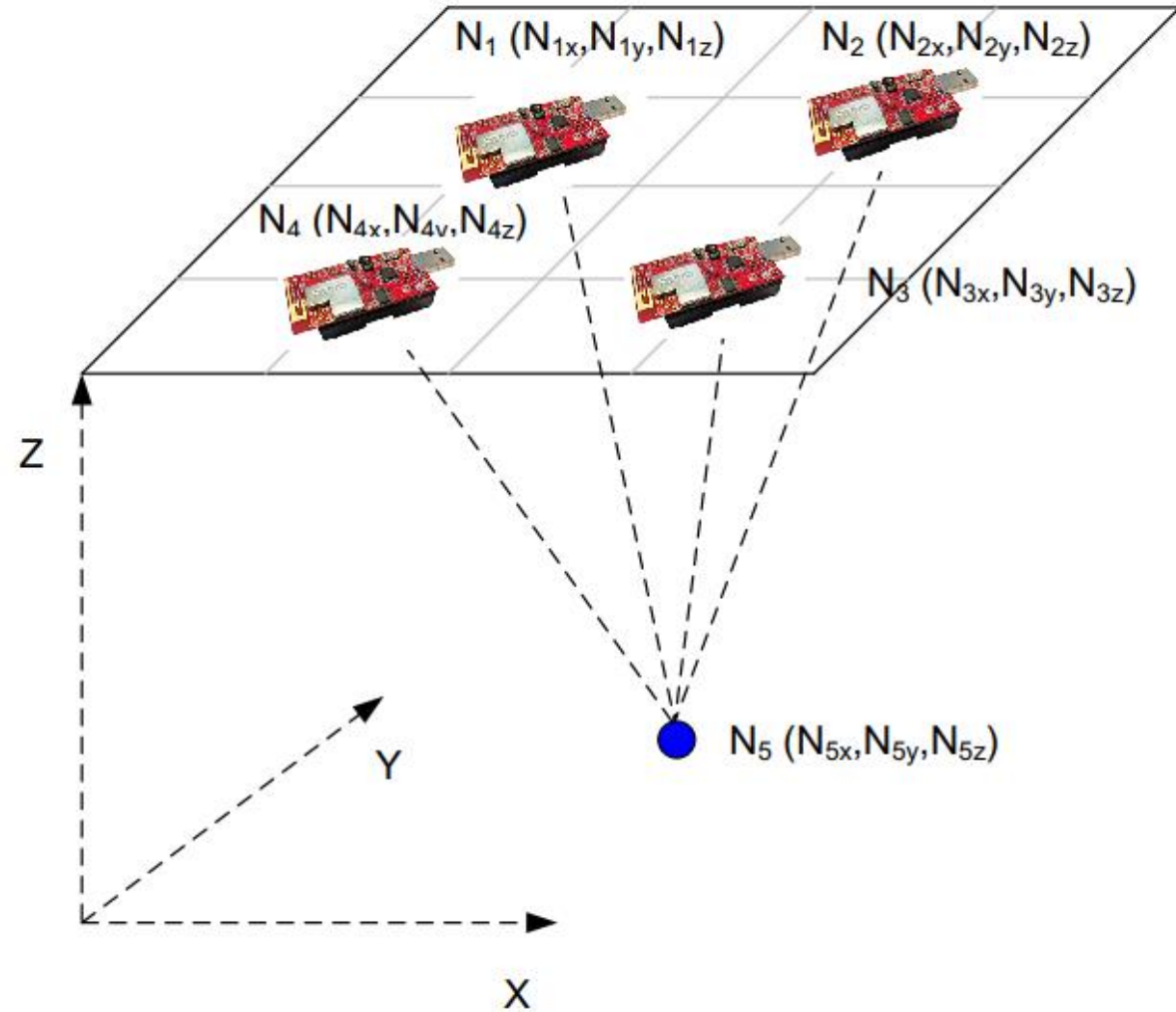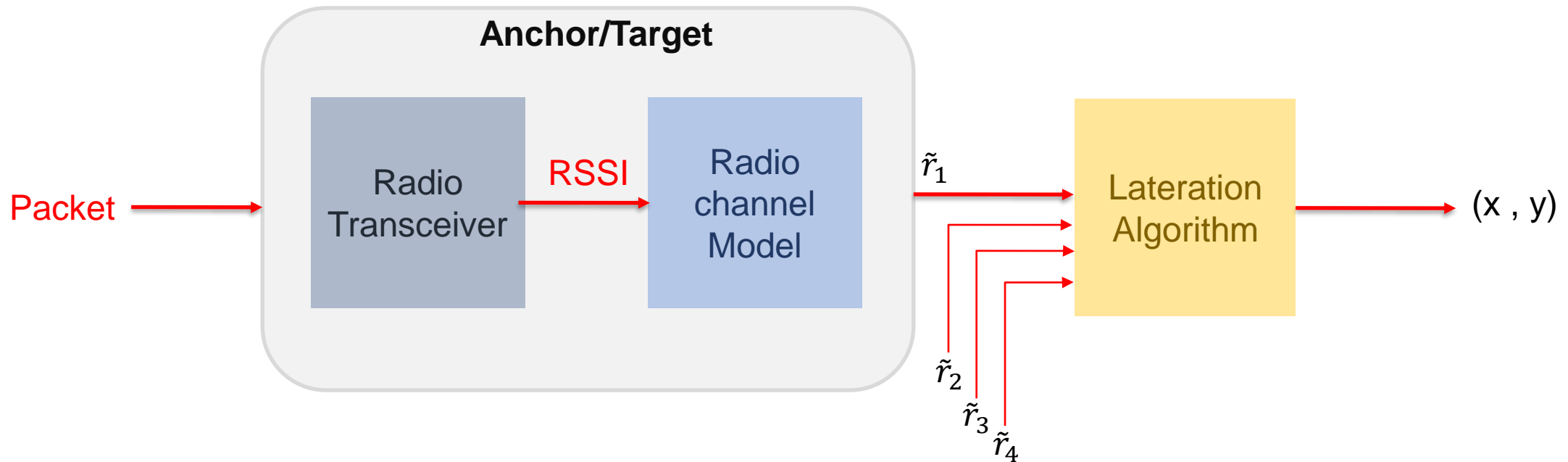
Solution

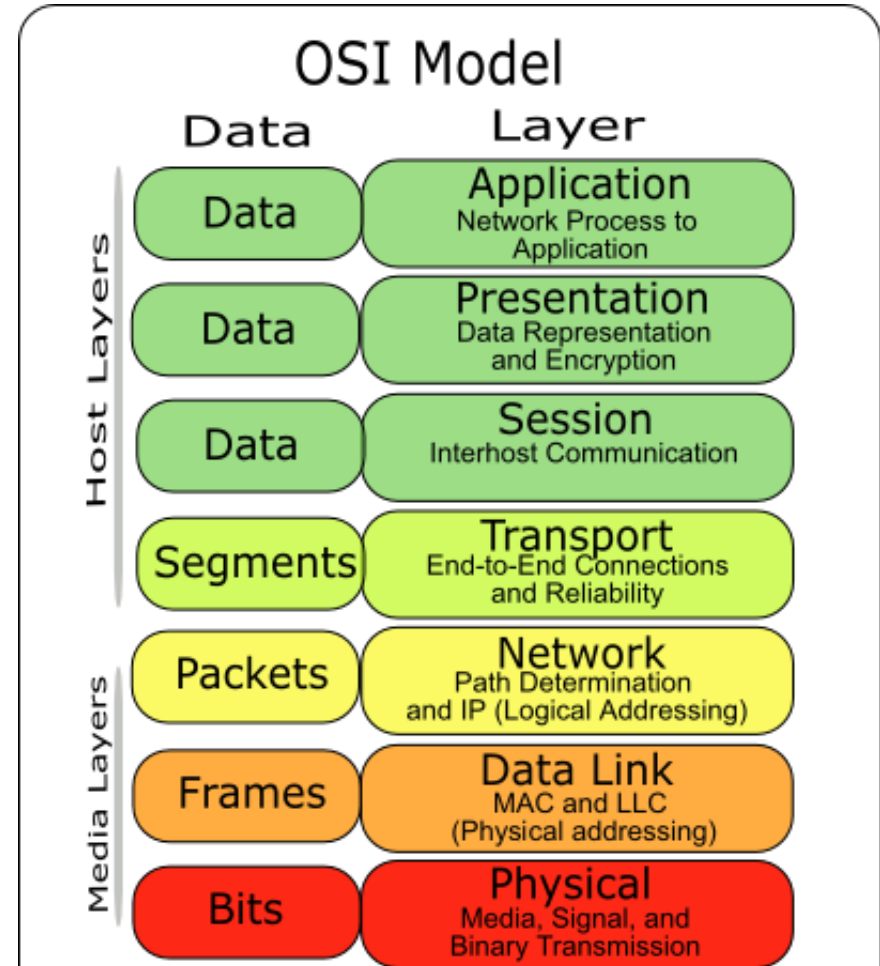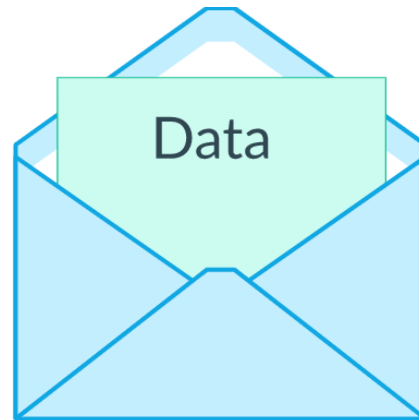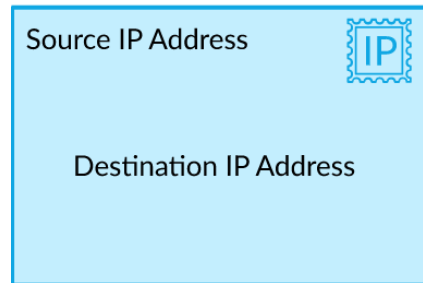# Solution

- System architecture

Implementation

Implementation

- Mechanism (pipeline overview)
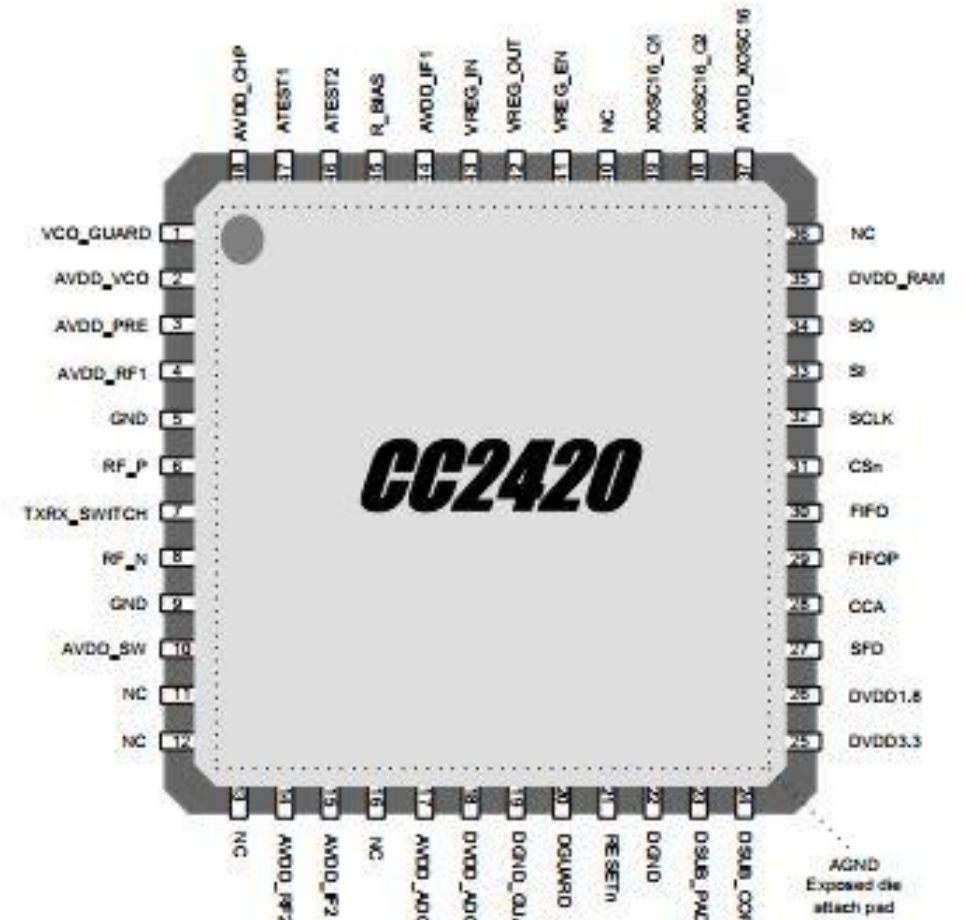
Implementation

- Packet

Implementation

- ## Radio Transceiver

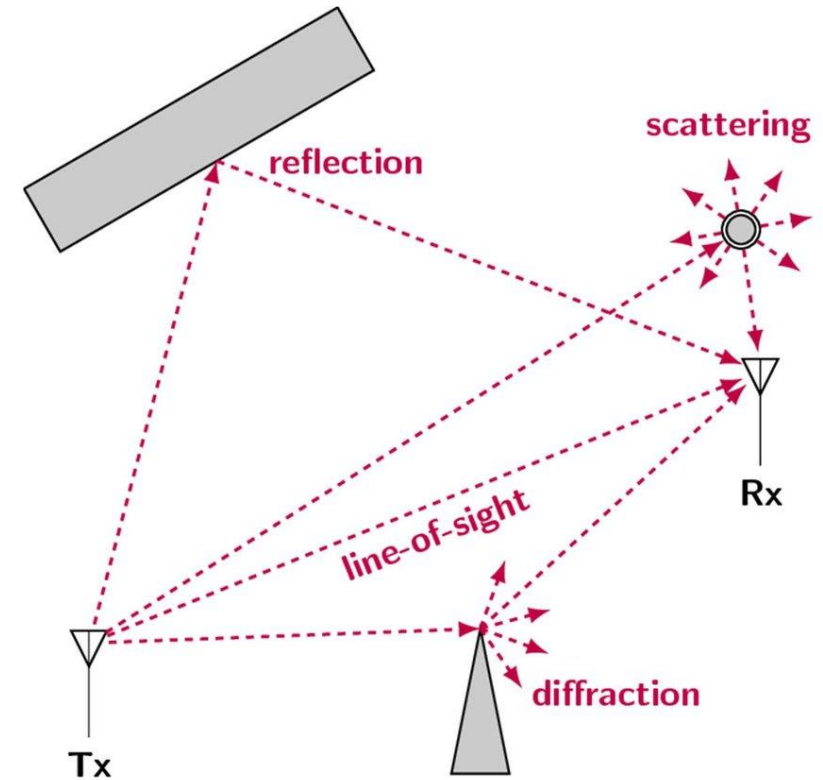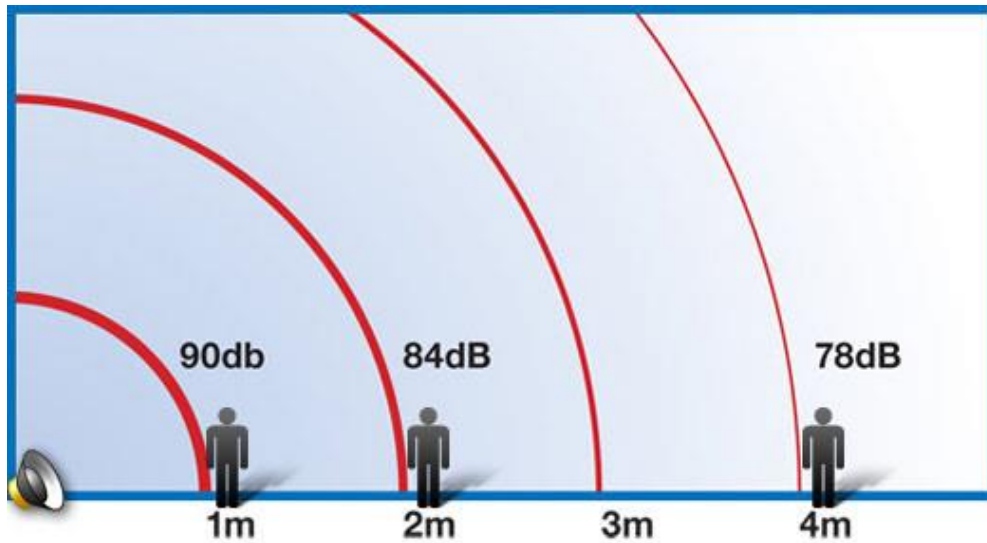 - Hardware chip transmitting/receiving packets
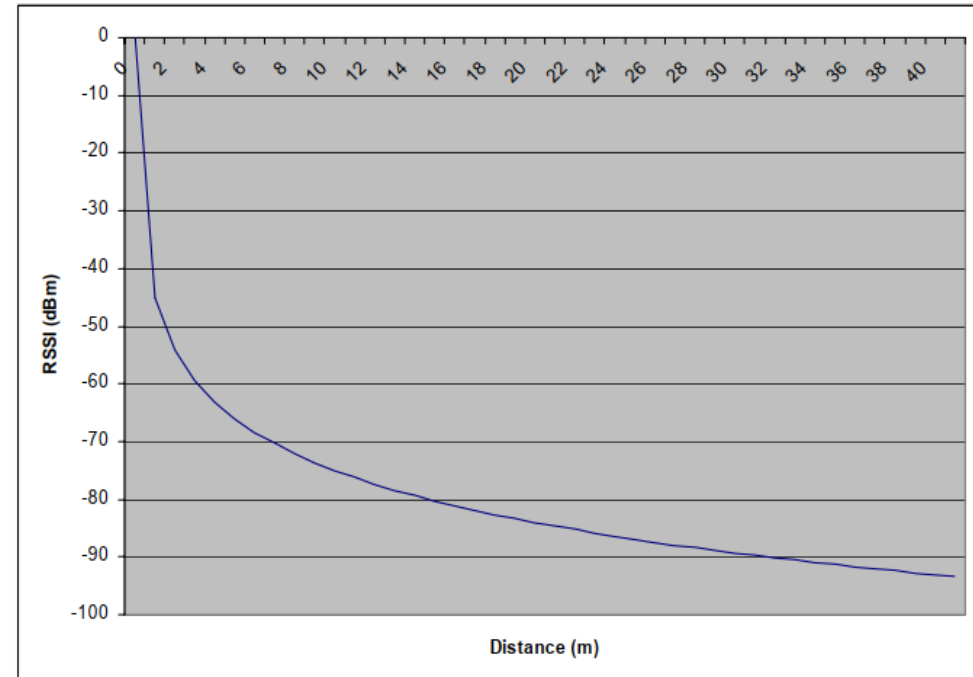 - Estimate RSSI

Implementation

- Radio Channel Model

Implementation

- Radio Channel Model

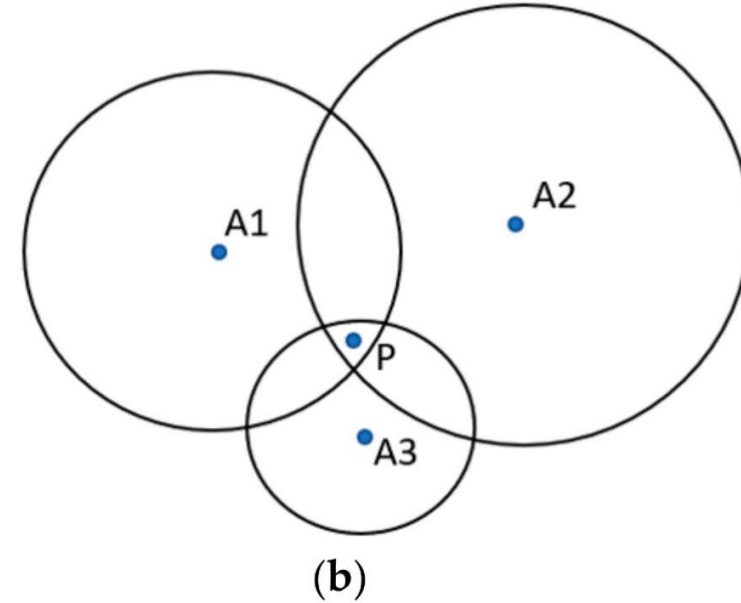$$P_r \, [dBm] = \alpha + \beta \log_{10}(d_i)$$

$$d_i = 10^{\frac{P_r - \alpha}{\beta}}$$

Implementation

- Lateration Algorithm

(a)   (b)
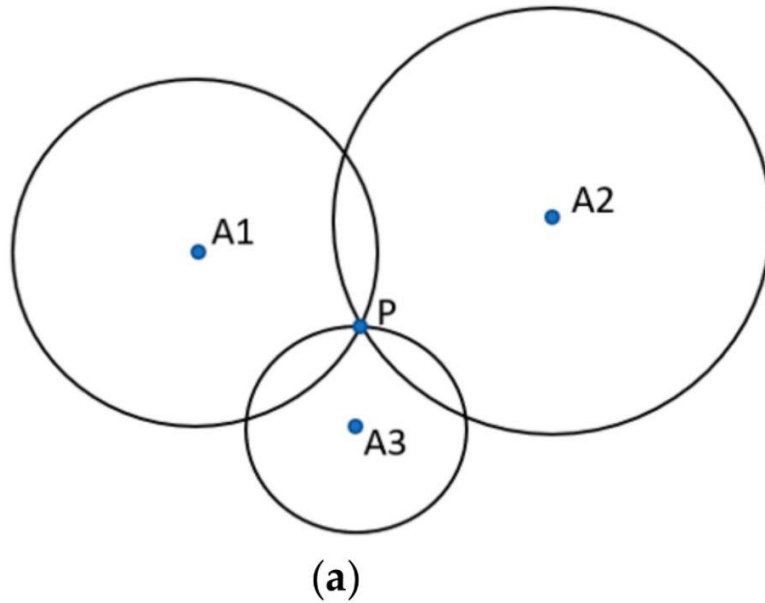
Improvements

Improvements

- Increase antennas sensitivity

- Limitations: frequency, h/w configuration
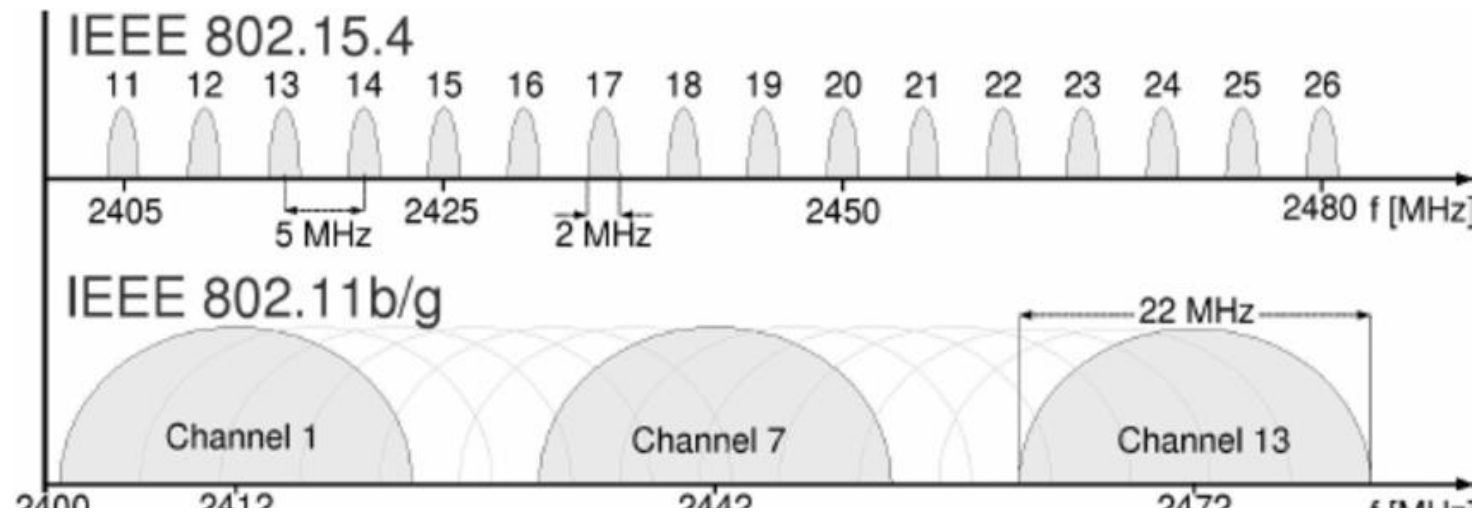
Improvements

PA_LEVEL	TXCTRL register	Output Power [dBm]	Current Consumption [mA]
31	0xA0FF	0	17.4
27	0xA0FB	-1	16.5
23	0xA0F7	-3	15.2
19	0xA0F3	-5	13.9
15	0xA0EF	-7	12.5
11	0xA0EB	-10	11.2
7	0xA0E7	-15	9.9
3	0xA0E3	-25	8.5

Table 9. Output power settings and typical current consumption @ 2.45 GHz

References

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- Lateration-localizing algorithm for energy-efficient target tracking in wireless sensor network
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- Auto-localization algorithm for local positioning systems
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References

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Thank you for your attention

Q&A