Variations in Wi-Fi Beacon Packets RSSIs due to interference from different Wi-Fi devices and the usage of different chipset

Aravinth, S. Panchadcharam

Supervisors:
Dr. Arash Behboodi
Filip Lemic

Telecommunication Networks Group
Technische Universität Berlin

Outline

- Introduction
- Problem statement
- Initial design idea
- Initial implementation idea
- Expected Results
- Schedule
- Conclusion

Introduction

- Beacon packet:
  - Contains information about WiFi Network
  - Transmitted periodically to announce the presence of a Wireless LAN Access Point
- RSSI
  - RSSI - *Received Signal Strength Indicator*
  - Indicates the power of a signal that is received at the receiver side
  - One field of a beacon frame
- Beacon packets' RSSI values are extensively used for ranging and localization purposes – They should be reliable!!

Problem Statement

- RSSI values from beacon packets have significant variations:
  - Calculation of the RSSI values is not defined by any standard
  - Various chipsets report RSSI values differently
  - RSSI measurements vary with temperature
  - RSSI measurements are affected by different types of interference
  - The relation between RSSI values and distance between transmitter and receiver is unreliable
- Idea – examine how RSSI values are changed due to interference, different chipsets and distance

Initial Design Idea

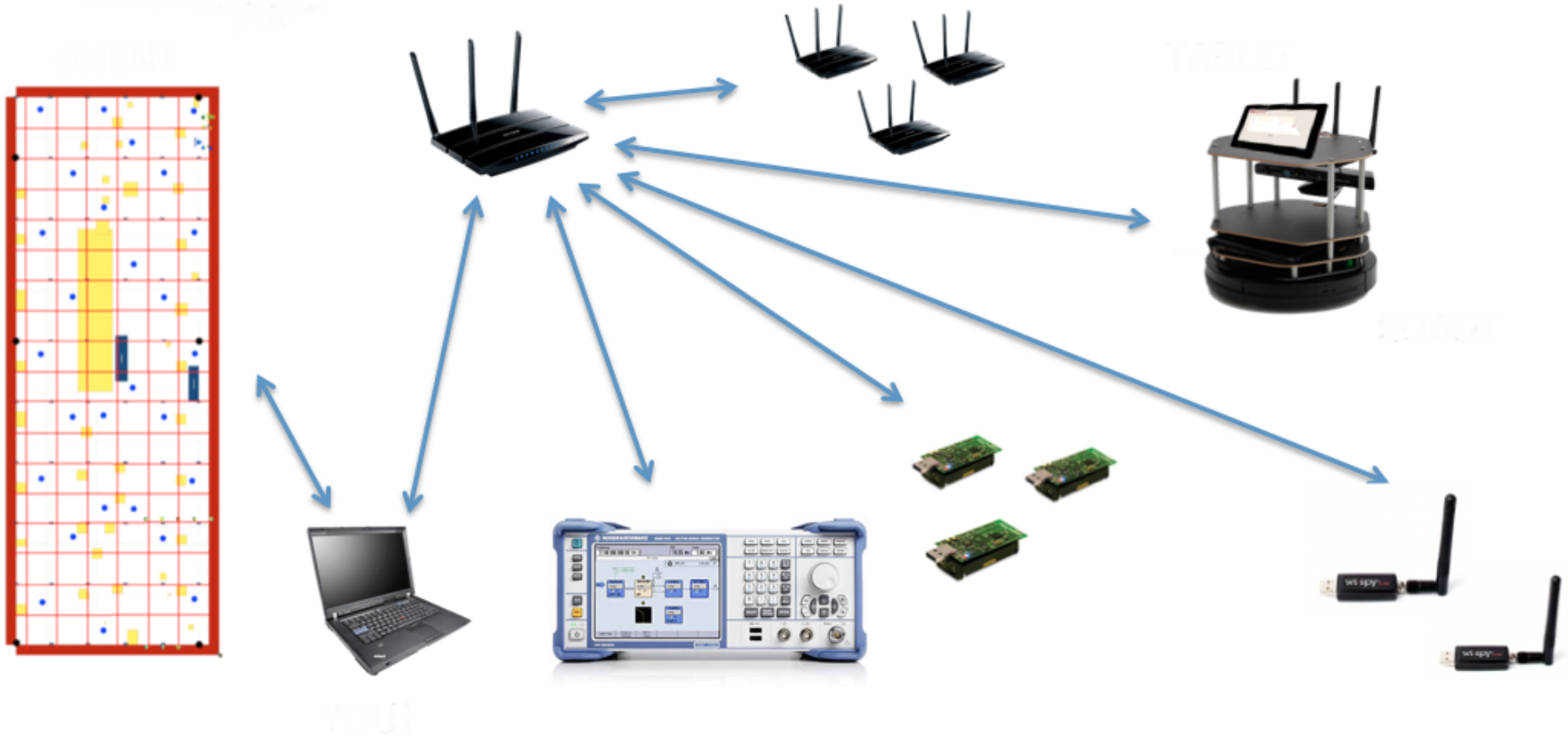
- examine how RSSI values are changed experimentally by doing RSSI measurements
- Measuring, storing and analyzing Wi-Fi beacon packets' RSSI values:
  - In different scenarios:
    - without controlled interferences and with minimized uncontrolled interference
    - with controlled interferences:
      - Different types of controlled interference
      - Different parameters of controlled interference
  - In two different testbeds:
    - TKN – TWIST testbed
    - iMinds – w-iLab.t II

Initial implementation idea

- Robotic platform will be used for measuring in a precise and repeatable way:
  - Robot will enable an automatic measurement survey
  - Robot will provide accurate locations where measurements are taken
- Storage of the data using web service (R2DM) implemented for the EVARILOS project
- Interference generation using different devices:
  - Wi-Fi routers – generation of the Wi-Fi traffic or jamming on the Wi-Fi channels
  - ZigBee nodes – generation of the ZigBee (IEEE 802.15.4) traffic or jamming on the ZigBee channels
  - Signal generator – generation of microwave or Bluetooth interference

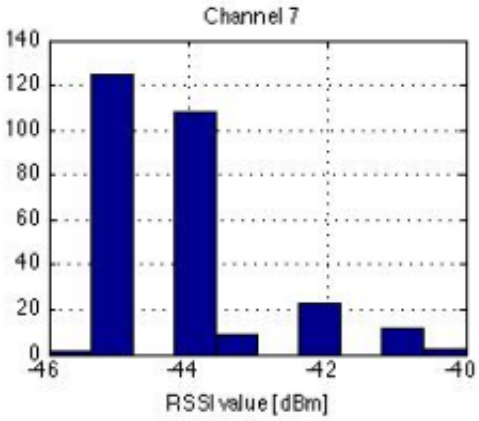
Initial Implementation Idea

- Envisioned Components:



Expected Results

- Expected output is a database of the beacon packets' RSSI measurements collected in different testbeds, at various locations and in different scenarios
- Analysis of the results:
  - Calculation of statistical data describing the results, e.g. mean value and standard deviation
  - Graphical presentation of the results
  - Capturing the changes of RSSI values due to interference, different chipsets and distance
- Is there a pattern??



Time Plan

- 16.10.2013 – Project Introduction
- 04.11.2013 – Project Presentation
- 3 weeks – Experiments preparation, defining the scenarios, locations, interference types and parameters, etc.
- 25.11.2013 – 1st Milestone
- 3 weeks – Experiments, measurements
- 23.12.2013 - 2nd Milestone
- 3 weeks – Analyzing the achieved results, calculation of the statistical data, presentation of the results
- 20.1.2014 – Final presentation
- 27.1.2014 – Submission

Thanks for your attention!