Technische Hochschule Nürnberg

Fakultät Informatik

Industrial WLAN: Performance Optimization through Automatic Analysis and Configuration Generation in a Real-Time Environment

Bachelorarbeit im Studiengang Informatik

vorgelegt von
Robin Sam Rosner

Matrikelnummer 362 5303

Erstgutachter:	Prof. Dr. Friedhelm Stappert
Zweitgutachter:	Prof. Dr. Hans Löhr
Betreuer:	Yannik Suedbeck
Unternehmen:	Siemens GmbH

Kurzdarstellung

remove all blind text

Kurze Zusammenfassung der Arbeit, höchstens halbe Seite. Deutsche Fassung auch nötig, wenn die Arbeit auf Englisch angefertigt wird.

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Abstract

Only if thesis is written in English.

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Contents

1 Introduction

1.1 Background and Motivation

Introduction [1] to the importance of optimizing industrial WLAN networks and the challenges in real-time environments.

1.2 Problem Statement

Description of the specific problem and the need for a tool for automatic optimization.

1.3 Objectives of the Thesis

Definition of the objectives, including the development of the tool and the optimization methods.

1.4 Structure of the Thesis

Overview of the structure of the thesis.

2 State of the Art

2.1 Industrial WLAN Networks

Overview [2, p. 1-23] proof current technologies, standards, and challenges in industrial environments.

2.2 Performance Optimization

Analysis of existing methods for optimizing network performance in real-time systems.

2.3 Relevant KPIs

Discussion of Key Performance Indicators (KPIs) used to evaluate and optimize network performance.

2.4 Existing Optimization Tools

Analysis of existing tools and their limitations, justifying the need for a new tool.

3 Requirements for the Tool and Optimization

3.1 Functional Requirements

Definition of the specific requirements for the tool, such as automatic KPI collection, optimization suggestions, and configuration adjustments.

3.2 Non-functional Requirements

Requirements related to the performance, robustness, and integration of the tool into existing systems.

3.3 Success Criteria and Metrics

Definition of metrics to measure success, e.g., improvements in latency and connection stability.

4 Development of the Optimization Tool

4.1 Tool Conceptualization

Presentation of the concept and architecture of the tool that performs the optimization.

4.2 Tool Implementation

Technical implementation, including the main components and interfaces, without going into too much detail.

4.3 Integration of Optimization Algorithms

How the developed optimization strategies are embedded and applied within the tool.

5 Theoretical Fundamentals of Optimization

5.1 Optimization Theories and Algorithms

Overview of relevant optimization methods used in the development of the tool.

5.2 Parameter Selection

Criteria for selecting parameters to be optimized based on KPIs.

5.3 Dynamics of Network Configurations

Investigation of how network configurations and KPIs interact and how this is considered in the optimization.

6 Development and Validation of the Optimization Algorithm

6.1 Algorithmic Approaches

Description of the developed algorithms for optimizing network performance.

6.2 Validation and Test Scenarios

Description of the tests conducted to validate the algorithms in real or simulated network environments.

6.3 Optimization Results

Evaluation of the optimization results concerning the established metrics.

7 Results and Discussion

7.1 Tool Performance

Evaluation of how well the developed tool meets the requirements and what optimization results were achieved.

7.2 Discussion of Optimization Results

Comparison of the results with expectations and other approaches; reflection on the success and challenges of the optimization.

7.3 Potential for Improvement

Suggestions for possible further development of the tool and optimization algorithms.

8 Conclusion and Outlook

8.1 Summary of the Thesis

Compact summary of the key findings, both in terms of the tool and the optimization methods.

8.2 Future Work

Discussion of open questions and potential extensions of the tool.

A Supplemental Information

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This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

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List of Figures

List of Tables

List of Listings

Bibliography

[1] F. R. et al., *SCALANCE W700 11n Service Dokument für IWLAN Geräteanalyse*, 2019.

[2] F. Tramarin, A. K. Mok, and S. Han, "Real-time and reliable industrial control over wireless lans: Algorithms, protocols, and future directions," *Proceedings of the IEEE*, vol. 107, no. 6, pp. 1027–1052, 2019.

Glossary

library A suite of reusable code inside of a programming language for software development. i

shell Terminal of a Linux/Unix system for entering commands. i