

# Resilient Networks

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Computer Science and the Graduate Faculty of the University of Kansas  
School of Engineering in partial fulfillment of  
the requirements for the degree of Master of Science

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**Resilient Networks**

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# Abstract

This is the abstract. Keep it one paragraph at max 150 words. The abstract shouldn't overflow one page. It should be only paragraph.

I like to dedicate this work to Homer Simpson.....

# Acknowledgements

I would like to thank to my comittee members.

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# Chapter 1

## Introduction and Motivation

Communication networks are becoming more important and ubiquitous. This is a result of society's increasing dependance on Internet infrastructure. Continue with more introduction.

The rest of the thesis is organized as follows. The subject of resilience and survivability, as well as related works in the subject area are discussed in chapter 2. Chapter 3 describes the modeling of resilient networks for simulations. Performance results of the networks under failures are shown in chapter 4. The evaluation of the models and comments on future work to be done on the resilient networks are discussed in chapter 5.

# Chapter 2

## Background and Related Work

Resilient networks have been studied in a variety context. Survivability is studied in [1], whilst resilience is studied in in [2].

Continue with the background and related materials for the rest of this chapter.

# Chapter 3

## Simulations

### 3.1 Simulation Model

Simulations are performed in ns-3 [3]. ns-3 is a powerful tool to study, analyze, model the networks in a smaller scale.

The parameters used in the simulations can be seen in table 3.1.

**Table 3.1.** Simulation Parameters

Parameter	Value
Routing	Static
Area	$150 \times 150$
Simulation time	100 [s]
Link layer	802.11

### 3.2 Simulation Scenarios

The changes required to run the simulations.

# Chapter 4

## Analysis

The results are presented. Briefly talk about different scenarios.

IMPORTANT NOTE ABOUT FIGURES: Plots need to be generated using gnuplot. Figures need to be produced in PowerPoint (.ppt) and converted to PDF. Don't forget that you will be asked to provide the source files for figures and plots!

### 4.1 Analysis of Baseline

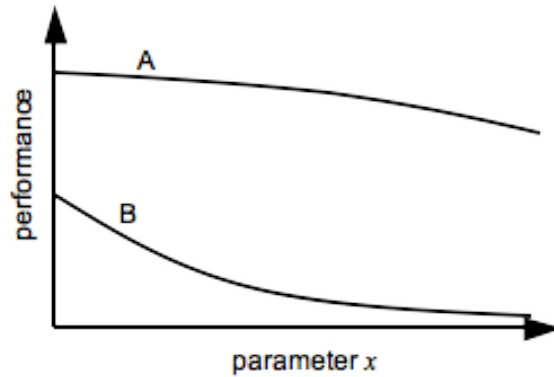
Present the baseline results. What are the metrics you are comparing? Why did you choose those metrics?

Example of a bad plot [4] can be see in figure 4.1. The figure is put as an example to show the low quality plot. Plots need to be generated via gnuplot.

### 4.2 Analysis of Catastrophic Failures

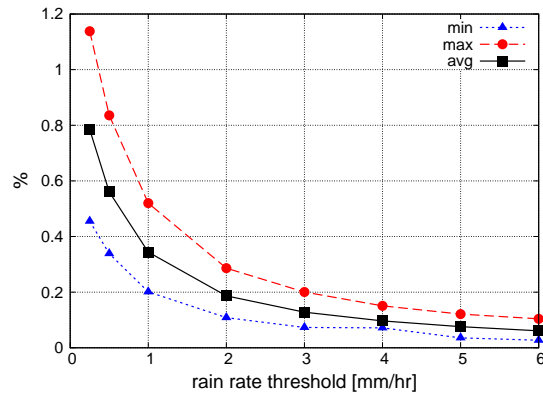
Put the results here for catastrophic failures scenarios. What's happening compared to baseline scenarios?

Aggregate rain rate under the circumstances can be see in figure 4.2. Can



**Figure 4.1.** Example of a Bad Plot

you see the difference between figure 4.2 and figure 4.1? The plots in figure 4.2 are produced with gnuplot. Plots should be produced in gnuplot!!!



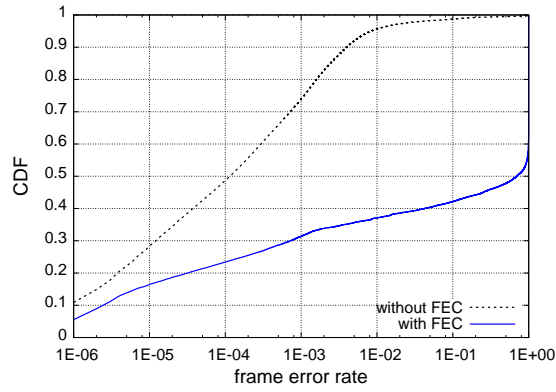
**Figure 4.2.** Aggregate Rain Rate

On the other hand the figures need to be generated using the PowerPoint (.ppt). The figures then need to be converted to PDF format. You will need to submit all the raw figures to Dr. Sterbenz. If you have questions about figures or format, contact to ResiliNets group.

### 4.3 Analysis of Non-Catastrophic Failures

Put the results here for non-catastrophic failures scenarios. What's happening compared to baseline scenarios?

Frame error rate vs. CDF under the circumstances can be seen in figure 4.3.



**Figure 4.3.** Frame Error Rate

# Chapter 5

## Conclusions and Future Work

Make sure that you conclude the thesis. You don't have to repeat the results again here but you need to be able to interpret the results and infer something from the results.

In this paper we have presented resilient networks that are really resilient to disruptions. The simulation results have shown that the failures can be prevented with more link redundancy.

What can be done for the future work? State them in this section.

# References

- [1] A. Ramamurthy and O. Ergin. Survivable networks. *Journal of Technology*, 2(1):8, 2001.
- [2] K. Sarandal, N. Sarandal, J. Smith, J. Miner, and K. Jayhawk. Resilience in layered networks. *IEEE Communications Magazine*, 7(4):10–16, 1990.
- [3] N. Simulator. 3 (ns3)(2007) URL: <http://www.nsnam.org>. *Consulted on*, 11.
- [4] Akira Tanaka and Georg Müller. A survey of proposed enhancements to protocol h. In *ProtEnh '06: Proceedings of the ACM Conference on Protocol Enhancements*, pages 205–215, New York, NY, USA, 2006. ACM.