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–Faculty of Computer Science and Engineering–

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Frankfurt, 23. November 2020

James Bond

ABSTRACT

Many state of the art ...

ZUSAMMENFASSUNG

Viele ...

CONTENTS

LIST OF FIGURES

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ACRONYMS

ASIC Application Specific Integrated Circuit

FPGA Field Programmable Gate Array

VHDL Very High Speed Integrated Circuit Hardware Description Language

PRBS Pseudo Random Binary Sequence

FIFO First In First Out

DoS Denial of Service

NoC Network on Chip

MPSoC Multiprocessor System on Chip

IPA Intellectual Property Abstraction

PE Processing Element

LUT Lookup Table

FF Flip-Flop

BRAM Block RAM

RAM Random Access Memory

Part I

THESIS

1 INTRODUCTION

1.1 MOTIVATION

In the field of

2 BACKGROUND

This chapter introduces ...

2.1 MY NAME SECTION

The term ...

3 STATE OF THE ART

Several research groups [2][3] have presented ...

4 THE METHOD

In order to communicate through the Network on Chip (NoC), a common Intellectual Property Abstraction (IPA) sending an incomplete packet.

5 EIN WEITERES KAPITEL

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5.1 LISTEN

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2. Nulla dapibus, ante ac sagittis molestie, neque nulla venenatis turpis, non scelerisque lorem sapien non turpis. Sed dolor magna, vestibulum imperdiet condimentum vel, imperdiet ac mi. Cras in orci egestas purus rhoncus congue. Cras cursus leo nec turpis laoreet non malesuada est pretium.
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5.2 grafiken

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5.2.1 *Einfache Grafiken*

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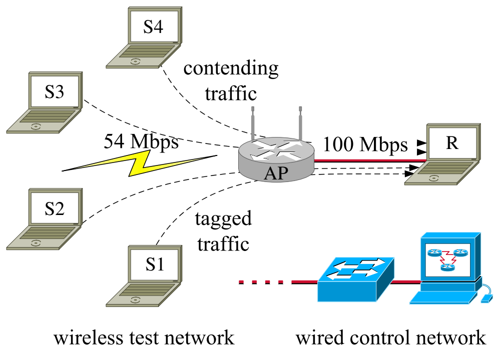

Figure 5.1: Dies ist eine einfache Grafik

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5.2.2 *Grafiken mit Subfloat*

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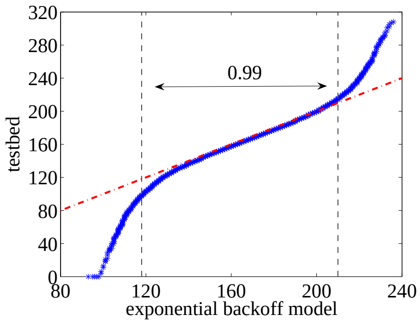
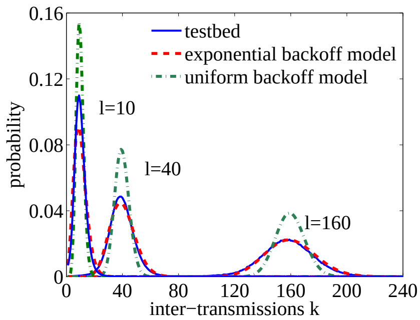
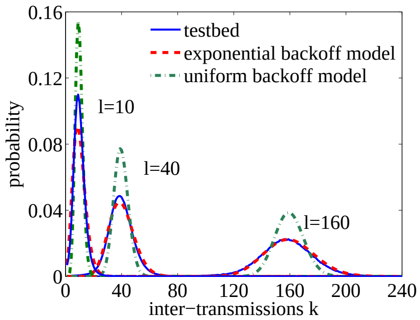


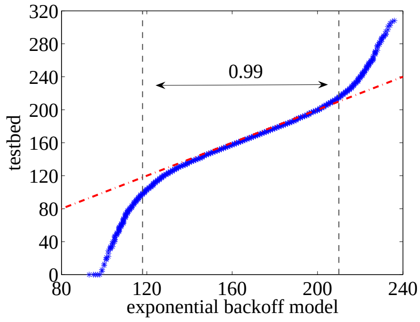
(a) Asia personas duo.



(b) Pan ma signo.



(c) Methodicamente o uno.



(d) Titulo debitas.

Figure 5.2: Mit Subfloat lassen sich mehrere Grafiken neben- und untereinander darstellen. Jeder Figure kann dabei mit einem eigenen Text versehen werden.

5.2.3 *Grafiken mit Minipage*

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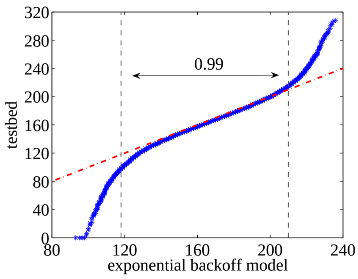

Figure 5.3: Minipage-Grafik Nummero uno

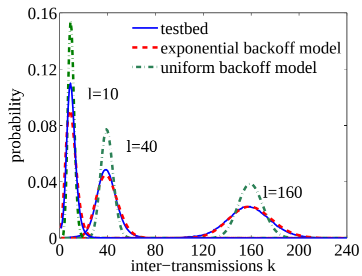

Figure 5.4: Minipage-Grafik Nummer zwei

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5.3 TABELLEN

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5.4 LISTINGS

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5.5 EQUATIONS

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$$U = R * I \tag{5.1}$$

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$$I = \frac{U}{R} \tag{5.2}$$

In the following we use probability theory to derive closed-form expressions for the fairness that is achieved among M contending stations. We tag station M and denote K_i the inter-transmissions of station $i = 1 \dots M-1$ and let $K = \sum_{i=1}^{M-1} K_i$. The conditional probability $P[K{=}k|l]$ can be defined for $M \geq 2$ as

$$\mathsf{P}[K{=}k|l] = \mathsf{P}\left[\sum_{i=1}^{M-1} K_i = k \middle| l\right] \tag{5.3}$$

where the random variables K_i are the integers that satisfy

$$\sum_{j=1}^{K_i} b_i(j) \leq \sum_{j=1}^{l} b_M(j) \quad \text{and} \quad \sum_{j=1}^{K_i+1} b_i(j) > \sum_{j=1}^{l} b_M(j).$$

5.6 THEOREM AND PROOF

We use the central limit theorem to derive the long-term fairness. In the sequel, we denote normal random variables $N(\mu,\sigma^2)$ where μ is the mean and σ^2 the variance.

Theorem 1 (Gaussian approximation) *Let the $b_i(j)$ be i.i.d. random variables with mean μ and variance σ^2 and let $M = 2$. For $k,l \gg 1$ (5.3) is approximately Gaussian where*

$$\mathsf{P}[K{\leq}k|l] \approx \mathsf{P}\left[N(0,1) \leq \frac{\mu\,(k-l)}{\sigma\,\sqrt{k+l}}\right].$$

Proof For $M = 2$ we have from (5.3) that

$$\mathsf{P}[K{<}k|l] = \mathsf{P}\left[\sum_{j=1}^{k} b_1(j) > \sum_{j=1}^{l} b_2(j)\right]$$

and after expansion and some normalization this equals

$$= \mathsf{P}\left[\frac{\sum_{j=1}^{l} b_2(j) - l\mu}{\sigma\sqrt{l}} - \frac{\sum_{j=1}^{k} b_1(j) - k\mu}{\sigma\sqrt{l}} < \frac{\mu(k-l)}{\sigma\sqrt{l}}\right].$$

Using the central limit theorem it follows that

$$\mathsf{P}[K{<}k|l] \approx \mathsf{P}\left[N(0,1) - N\left(0,\frac{k}{l}\right) < \frac{\mu(k-l)}{\sigma\sqrt{l}}\right].$$

Since the normal distribution with zero mean is symmetric we can replace the subtraction of $N(0,k/l)$ by addition. Furthermore, the sum of two normal random variables $N(\mu_1,\sigma_1^2)$ and $N(\mu_2,\sigma_2^2)$ is normal with $N(\mu_1+\mu_2,\sigma_1^2+\sigma_2^2)$ such that

$$\mathsf{P}[K{<}k|l] \approx \mathsf{P}\left[N\left(0,\frac{k+l}{l}\right) < \frac{\mu(k-l)}{\sigma\sqrt{l}}\right].$$

Finally, we use that if X is $N(a\mu, a^2\sigma^2)$ then $Y = X/a$ is $N(\mu, \sigma^2)$ with $a^2 = (k+l)/l$ to standardize the result. ∎

Th. 1 assumes i.i.d. random countdown values. It does, however, not make any assumption about their distribution.

6 EXPERIMENTS AND RESULTS

The experiments chapter demonstrates the methods of verification that were taken in order to test the functionality of the IPA.

7 CONCLUSION AND FUTURE WORK

As it was shown in Chapter 6, it is possible to ...

Part II

APPENDIX

BIBLIOGRAPHY

[1] Jon Bentley. *Programming Pearls*. 2nd ed. Boston, MA, USA: Addison–Wesley, 1999.

[2] Viktor E. Frankl. *Man's Search for Meaning*. Boston, MA, USA: Beacon Press, 1959.

[3] Neil Postman. *Amusing Ourselves to Death: Public Discourse in the Age of Show Business (20th Anniversary Edition)*. New York, NY, USA: Penguin Books, 2005.