

# Dr. Roland Kempter

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## EDUCATION

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**Ph.D. Electrical and Computer Engineering,**

December 2006

The University of Utah, Salt Lake City, Utah, USA

Dissertation: “Modeling and Evaluation of Throughput, Stability and Coverage of RP-CDMA in Wireless Networks”

Advisor: Prof. Behrouz Farhang-Boroujeny

**M. Eng. Electrical and Computer Engineering,**

May 2005

The University of Utah, Salt Lake City, Utah, USA

**Dipl. Ing. (FH) Applied Physics,**

October 2000

The University of Applied Sciences, Weingarten, Germany

Thesis: “A Sensor for the Detection of DeNOx Catalytic Converters”

Advisor: Prof. Gregor Zibold

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## EXPERTISE

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- Satellite communication systems (VSAT and DVB-RCS)
- Design and installation of satellite base stations
- Random wireless multi-access systems,  
standards: IEEE 802.11x, Aloha-flavors
- Scheduling-based wireless multi-access systems (FDMA, (MF-) TDMA, CDMA),  
standards: UMTS, CDMA2000, GSM, DVB-S, DVB-RCS
- CDMA (iterative) detection
- OFDM and Filterbank multicarrier
- Cognitive radio systems,  
standards: IEEE 802.22
- Software defined radio
- Cross-layer design of wireless communication systems
- IP topology (design of networks + configuration of routers...),  
routing protocols: BGP, MPLS, RIP, OSPF
- TCP (+ over wireless)
- ATM
- SS7
- Voice over IP
- Mobile IP
- Advanced computer network architectures (active networks)
- Ad-hoc networks
- Network Security (VPN, IPSec, Firewalling)

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## TECHNOLOGY SKILLS

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- MATLAB
- Network Analysis Tools (RMON...)
- NORTEL BN/BCN router series
- BayRS software
- EMULAB/NS2
- Simulink
- OPNET
- Perl
- C
- MATHEMATICA
- Windows, OS X, LINUX, SOLARIS
- LaTeX
- Microsoft Office Suite
- Adobe Creative Suite

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## PROFESSIONAL EXPERIENCE

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### Post Doctoral Research Fellow

The University of Utah, Department of Electrical and Computer Engineering  
Laboratory of Prof. Behrouz Farhang-Boroujeny

Sept. 2006  
to present

- Communication methods for cognitive radio systems

### Graduate Research Assistant

The University of Utah, Department of Electrical and Computer Engineering  
Laboratory of Prof. Behrouz Farhang-Boroujeny

Aug. 2002  
to Sept. 2006

- Physical, MAC and network layer design and optimization of random channel access systems
- CDMA iterative detection methods.

### System Engineer

NDSatCom, Immenstaad, Germany

Oct. 2000  
to July 2002

- Design of IP Networks:  
IP layout and hub station IP design for the first DVB-RCS two-way satellite communication system for SES ASTRA
- European Space Agency (ESA) with EMS Technologies, Canada:  
West Early Bird, IP routing scheme and DVB-S frame-scheduler design for the first commercial satellite with on-board switching capabilities

### Graduate Research Assistant (Diploma Student)

The University of Applied Sciences, Weingarten, Germany in collaboration with  
DaimlerChrysler DORNIER, Immenstaad, Germany

Jan. 2000  
to Aug. 2000

- Sensors and detection methods for catalytic converters

### Engineering Consultant

Master's Nachbaur, Wangen, Germany

March 1996  
to Feb. 2000

- Design and administration of computer networks
- Repair of home electronics devices (TVs etc.)

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| <p><b>Internship</b><br/>         LIEBHERR AEROSPACE, Lindenberg, Germany</p> <ul style="list-style-type: none"> <li>· Design and testing of electromechanical flight control devices for the AIRBUS program</li> </ul>               | <p>March 1998<br/>         to Sept. 1998</p> |
| <p><b>Internship</b><br/>         ISW, Wangen, Germany</p> <ul style="list-style-type: none"> <li>· Modification of a computer program for the calculation of the static integrity of mechanical machinery and containers.</li> </ul> | <p>July 1997<br/>         to Oct. 1997</p>   |

## AWARDS AND CERTIFICATES

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| <p><b>Best Paper Award, ASEE International Division for the paper:</b><br/>         “Challenges in Curriculum Development Across Institutions of Higher Education: Similarities Between International and National Student Transfer”</p> | <p>June 2006</p>   |
| <p><b>College of Engineering Outstanding Teaching Assistant of the Year Award,</b><br/>         The University of Utah, Salt Lake City, Utah, USA</p>  | <p>August 2006</p> |
| <p><b>Higher Education Teaching Specialist (HETS) Designation,</b><br/>         The University of Utah, Salt Lake City, Utah, USA</p>  | <p>August 2006</p> |

## PUBLICATIONS UNDER REVIEW/PREPARATION

### Journal Publications

- [R1] R. Kempter, P. Amini and B. Farhang-Boroujeny, “Throughput and Stability of RP-CDMA and Spread Aloha in Multipacket Capture Channels”, *submitted to IEEE/ACM Transactions on Networking*, Oct. 2006, *Manuscript No. TNET-00372-2006*
- [R2] B. Farhang-Boroujeny and R. Kempter, “Multicarrier Communication Techniques for Spectrum Sensing and Communication in Cognitive Radios”, *submitted to IEEE Communications Magazine: Cognitive Radios for Dynamic Spectrum Access*, Sept. 2006
- [R3] R. Kempter and Rong-Rong Chen, “A Low-SNR Markov-Chain Monte-Carlo Technique for Resolving Collisions in Spread Spectrum Networks”, *in preparation*

## PUBLICATIONS

### Journal Publications

- [J1] R. Kempter, P. Amini, C. Schlegel and B. Farhang-Boroujeny, “On Coverage and Routing in Wireless CDMA Ad-hoc Networks”, *IEEE Sig. Proc. Mag.*, pp. 50-62, Vol. 23, No. 5, Sept 2006.
- [J2] C. Schlegel, R. Kempter and P. Kota, “A Novel Random Wireless Packet Multiple Access Method Using CDMA”, *IEEE Trans. Wireless Comm.*, pp. 1362-1370, Vol. 5, No. 6, June 2006.

### Conference Publications

- [C1] R. Kempter, C. Furse, N. Cotter, N. Safai and L. Brinton, “Challenges in Curriculum Adaptation Across Institutions of Higher Education: Similarities Between International and National Student Transfer”, *ASEE Annual Conference 2006, ASEE Best Paper Award International Division*.
- [C2] R. Kempter and Nick Safai, “Challenges in Curriculum Adaptation across Institutions of Higher Education in Support of Maintaining Academic Standards: Addressing Minorities and Underserved Populations”, *5th ASEE Global Colloquium on Engineering Education, Oct. 9-12, 2006, Rio de Janeiro, Brazil*

- [C3] R. Kempter and B. Farhang-Boroujeny, "Random Packet CDMA: Reducing Delay and Increasing Throughput of WLAN Systems", *2006 Software Defined Radio Technical Conference, November 13-17, 2006, Orlando/Florida.*
- [C4] P. Amini, R. Kempter and B. Farhang-Boroujeny, "A Comparison of Alternative Filterbank Multicarrier Methods in Cognitive Radio Systems", *2006 Software Defined Radio Technical Conference, November 13/-17, 2006, Orlando/Florida.*
- [C5] Z. Shi, C. Schlegel, R. Kempter and M. C. Reed, "On the Performance of Partitioned-Spreading CDMA", *in 40 th Annual Conference on Information Sciences and Systems, CISS 2006, Princeton, USA.*
- [C6] P. Amini, R. Kempter, R. R. Chen, L. Lin and B. Farhang-Boroujeny, "Filter Bank Multitone: A Physical Layer Candidate for Cognitive Radios", *2005 Software Defined Radio Technical Conference, November 14-18, 2005, Orange County/California.*
- [C7] R. Kempter, C. Schlegel and Z. Shi, "Optimizing the Performance of Uncoordinated Wireless Packet Transmission: RP-CDMA with Partitioned Spreading", *ISIT 2005, Poster Presentation, September 4-9 September 2005, Adelaide/ Australia.*
- [C8] R. Kempter and C. Schlegel, "Packet Random Access in CDMA Radio Networks", *in Proceedings of Allerton Conference 2005.*
- [C9] R. Kempter, B. Xin and S. K. Kasera, "Towards a Composable Transport Protocol: TCP Without Congestion Control", *ACM Sigcomm 2004, Poster Session, August 30-September 3, Portland/ Oregon.*
- [C10] R. Kempter and C. Schlegel, "Capacity and QoS Analysis for a Novel Packet Based Wireless Access System", *in 58 th Vehicular Technology Conference, Oct. 6-9, 2003, Orlando/Florida , Vol.: 3, Pages: 1432- 1436*

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## INVITED TALKS

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- R. Kempter, "On Coverage and Routing in Wireless CDMA Ad-hoc Networks", *Brigham Young University, Provo, USA, November 29, 2005*
- R. Kempter, "Wireless Random Packet Networking: A Physical and Network Layer Perspective", *The University of Alberta, Edmonton, CA, June 16 and 17, 2004*
- C. Schlegel and R. Kempter, "Random-Packet CDMA: A Novel Wireless Packet System", *iCORE Summit Plenary Presentation, June 7, 2004, Banff, Alberta, CA*
- R. Kempter, "Wireless Packet Networking: an Overview (and Some Novel System Ideas)", *The University of Alberta, Edmonton, CA, May 21, 2003*

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## TUTORIALS AND WORKSHOPS

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- B. Farhang-Boroujeny and R. Kempter, "Signal Processing Techniques for Spectrum Sensing and Communications in Cognitive Radio Networks", *Tutorial, 2006 Software Defined Radio Technical Conference, November 13-17, 2006, Orlando/Florida*
- R. Kempter, B. Farhang-Boroujeny and D. Hall, "Group Project ECE 3500, System Design of a Wireless Communication System and how to obtain Spectrum from the FCC", *in 1st C.L.E.A.R faculty workshop on teaching techniques in Engineering, The University of Utah, March 29, 2005*

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## GRANTS

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Contributed to University of Utah SEED grant for the development of novel Cognitive Radio technologies. PI: Behrouz Farhang-Boroujeny	Awarded Fall 2005
Contributed to University of Alberta, iCORE HCDC 5 year renewal grant, Alberta, Canada. PI: Christian Schlegel	Awarded Summer 2005

Contributed to NSF proposal, "Development of Next-Generation Network Research Testbeds", award #: EIA 0321350. PI: Jay Lepreau

Awarded  
Spring 2003

Contributed to NSERC proposal, "High-Capacity Wireless Packet Networks".  
PI: Christian Schlegel

Awarded  
Spring 2003

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## TEACHING EXPERIENCE

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### **Instructor for ECE 6962-003: Fundamentals of Wireless Networking**

Spring 2007

Co-taught with Rong-Rong Chen

- Development and delivery of lectures, homework, projects and exams

### **Teaching Assistant for ECE 3500: Introduction to Signals and Systems**

Fall 2005

to Prof. Behrouz Farhang-Boroujeny:

- Developed, supervised and administered class projects
- Developed and supervised laboratory classes

### **Teaching Assistant for ECE 6910: Software Defined Radio**

Spring 2005

to Prof. Behrouz Farhang-Boroujeny:

- Developed and administered class material and assignments
- Administered homework grades

### **Teaching Assistant for ECE 3500: Introduction to Signals and Systems**

Fall 2004

to Prof. Behrouz Farhang-Boroujeny:

- Developed, supervised and administered class projects
- Developed and supervised laboratory classes and administered homework grades

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## PROFESSIONAL MEMBERSHIPS

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Institute of Electrical and Electronics Engineers (IEEE), reviewer for:

- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Communications
- IEEE Transactions on Wireless Communications
- IEEE Communications Society, Sensor and Ad Hoc Communications and Networks
- IEEE Signal Processing Magazine

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## LANGUAGES

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- German – native language
- English – speak fluently and read/write with very high proficiency (US resident since July 2002)
- French – speak, read, and write with basic competence

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## REFERENCES

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- Dr. Behrouz Farhang-Boroujeny, Professor, Associate Chair,  
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The University of Utah,  
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Email: [farhang@ece.utah.edu](mailto:farhang@ece.utah.edu)  
Phone: +1 (801) 587-7959

- Dr. Cynthia Furse, Professor,  
ECE Department,  
The University of Utah,  
50 S. Central Campus Dr., Rm. 3102 MEB,  
UT 84112-9206, Salt Lake City, Utah, USA  
Web: [www.ece.utah.edu/~cfurse/](http://www.ece.utah.edu/~cfurse/)  
Email: [cfurse@ece.utah.edu](mailto:cfurse@ece.utah.edu)  
Phone: +1 (801) 585-7234
  
- Dr. Neal Patwari, Assistant Professor,  
ECE Department,  
The University of Utah,  
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- Dr. Marcel Kohl,  
Project Manager, ND SatCom AG  
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88090 Immenstaad, Germany  
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- Dr. Rong-Rong Chen, Assistant Professor,  
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