

WAN CHOI

Work Address

Wireless Networking & Communications Group
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Brief Biography

Wan Choi is currently a graduate student in the Department of Electrical and Computer Engineering at the University of Texas at Austin, in the Wireless Networking and Communications Group (WNCG). He received the B. Sc. and M. Sc. degrees from the School of Electrical Engineering, Seoul National University (SNU), Seoul, Korea, in 1996 and 1998, respectively. He was Senior Member of Technical Staff at R&D Division of KT Freetel Co. Ltd., Korea from 1998 to 2003. His research interests include all areas of wireless communications, including spread spectrum communications, OFDM communications, MIMO communications, UWB communications, and advanced communications systems. He is the recipient of IEEE Vehicular Technology Society Jack Neubauer Memorial Award which recognizes the best system paper published in the IEEE Transactions on Vehicular Technology for 2001.

Education

- | | | |
|--------------------------|---|--------------|
| Aug. 2003 –
present | The University of Texas at Austin
Ph.D. Student in Electrical and Computer Engineering
<i>Research Advisor:</i> Prof. Jeffrey G. Andrews
<i>Area:</i> Communications and Network Systems, <i>GPA:</i> 4.0/4.0
Member of WNCG (Wireless Networking and Communication Group) | Austin, TX |
| Mar. 1996 –
Feb. 1998 | Seoul National University
Master of Science in Electrical Engineering,
<i>Thesis:</i> Performance of frequency domain multiuser detector for synchronous CDMA over a Rician fading channel | Seoul, Korea |
| Mar. 1992 –
Feb. 1996 | Seoul National University
Bachelor of Science in Electrical Engineering | Seoul, Korea |

Related Course Works

Probability & Stochastic Process, Real Analysis I, Advanced Wireless Communications: Modulation & Multiple Access, Information Theory, Optimization in Engineering Systems, Digital Signal Processing, Advanced Math for Engineering, Topics in Communications, Advanced Digital Communications, Wireless & Satellite Communications, Detection & Estimation Theory, Advanced Signal Processing, Mathematical System Theory

Research Interests

Spread spectrum communications

- Code division multiple access (CDMA), acquisition and tracking, multiuser detection, multi-carrier CDMA systems, frequency hopping systems

Wireless communications and communication theory

- RX/TX Diversity, orthogonal frequency division multiplexing (OFDM), synchronization, modulation and demodulation, channel coding, multiple access technologies (CDMA, FDMA, TDMA, OFDMA), detection and estimation, equalization

Multiple-input multiple-output communications

- MIMO-CDMA systems, MIMO communications with linear receivers, cellular MIMO systems, array processing and beamforming, spatial multiplexing vs. diversity tradeoffs

Ultra wide band (UWB) communications:

- Performance analysis, UWB applications, system design

Mobile communication systems

- Capacity analysis, power control algorithm, handoff algorithm, call admission/congestion control, resource management

Practical wireless protocol & system design

- IS-95/cdma2000, EV-DO/DV, UMTS-WCDMA, IEEE 802.11a/b/g, IEEE 802.15, IEEE 802.16, wireless modem design

Academic Positions

- Aug. 2003 – present **University of Texas at Austin** Austin, TX
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
Graduate Research Assistant (advised by Prof. Jeffrey G. Andrews)
- Research of cellular MIMO-CDMA systems
 - Improved performance analysis of maximal ratio combining in CDMA systems
 - Design/analysis of a new diversity receiver in CDMA systems
- Mar. 1996 – Feb. 1998 **Seoul National University** Seoul, Korea
INSTITUTE OF NEW MEDIA & COMMUNICATIONS, SCHOOL OF ELECTRICAL ENGINEERING
Graduate Research Assistant
- Design/analysis of a frequency domain multiuser detector in Rician fading channel
 - Design/analysis of a physical layer protocol for future wireless communication systems
- Mar. 1996 – June. 1996 **Seoul National University** Seoul, Korea
SCHOOL OF ELECTRICAL ENGINEERING
Teaching Assistant
- Digital Communications (course number: 420-492)

Professional Engineering Experience

- Feb. 1998 – July 2003 **KT Freetel Co., Ltd.** Seoul, Korea
Senior Member of Technical Staff
- Deployment and system engineering of commercial IS-95B systems, cdma2000 1x systems and 1xEV-DO systems
 - Cell planning, system debugging, and parameter optimization (handoff, power control, etc.)

- Capacity analysis of IS-95 and IMT-2000 (WCDMA and cdma2000) systems
- Developed core algorithm of a cell planning tool for IMT-2000 systems
- Designed automatic frequency controller (AFC) in multi-carrier CDMA
- Developed interference cancelation algorithm for repeater systems
- Developed ultra small size 1xEV-DO Access Point (AP) system
 - High level system design and project management
- Developed and implementation of location estimation algorithm
 - Used the information reported from mobile station after pilot searching
 - Modified searcher S/W in mobile stations
- Acted as a deputy of KT Freetel in Standards Organizations (3GPP RAN WG1/WG4, 3GPP2 TSG-C, and ITU-R)
 - Analysis of physical layer protocols of UMTS WCDMA and cdma2000
 - Contributed standards specifications

Mar. 2001 –
Nov. 2001

EoNex Technologies, Inc.
Technical Consultant/Part Time Engineer

Seoul, Korea

- Developed and verified algorithms in WCDMA modem chipset
- Designed FIR TX filter of WCDMA modem chipset
- WCDMA link level simulation
 - Test vector generation for chipset test
 - Algorithm verification

Honors and Awards

- **IEEE Vehicular Technology Society Jack Neubauer Memorial Award**
Recognizes the best system paper published in the *IEEE Transactions on Vehicular Technology* in 2001. The title of the award-winning paper is “Forward link capacity of a DS/CDMA system with mixed multirate sources”

Journal Publications

1. **W. Choi**, J. G. Andrews, and R. W. Heath, Jr., “Multiuser antenna partitioning for MIMO-CDMA systems,” submitted to *IEEE Journal on Selected Areas in Comm.*, Oct. 2004.
2. **W. Choi** and J. G. Andrews, “Spatial multiplexing in cellular MIMO-CDMA systems with linear receivers: Outage probability and capacity,” submitted to *IEEE Trans. on Wireless Comm.*, Aug. 2004.
3. **W. Choi** and J. G. Andrews, “Improved performance analysis for maximal ratio combining in asynchronous CDMA channels”, submitted to *IEEE Trans. on Comm.*, Jan. 2004.
4. **W. Choi** and J. G. Andrews, “Generalized performance analysis of a delay diversity receiver in asynchronous CDMA channels”, accepted for publication in *IEEE Trans. on Wireless Comm.*, Aug. 2004.
5. **W. Choi**, C. H. Yi, J. Y. Kim and D. I. Kim, “A new base station receiver for increasing diversity order in a cellular CDMA system,” accepted for publication in *IEEE Trans. on Comm.*, May 2004.
6. **W. Choi** and J. Y. Kim, “Analysis of optimal parameters for hopping pilot beacon in IS-95 based mobile cellular networks,” submitted to *Telecommunications Review*, SK Telecom, under revision.

7. **W. Choi** and J. Y. Kim, "Performance of a multiuser detector with multicarrier transmission for a DS/CDMA system," *Journal of Wireless Personal Communications*, Kluwer Academic Publishers, vol. 22, no. 1, pp. 71-87, July 2002.
8. **W. Choi** and J. Y. Kim, "Joint Erlang capacity of downlink DS/CDMA system based on capacity sharing algorithm," *IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences*, vol. E84-A, no.6, pp.1406-1412, June 2001.
9. **W. Choi** and J. Y. Kim, "Forward link capacity of a DS/CDMA system with mixed multirate sources," *IEEE Transactions on Vehicular Technology*, vol.50, no.3, pp.737-749, May 2001.
10. **W. Choi**, B. Y. Cho, and T. W. Ban, "Automatic on-off switching repeaters for DS/CDMA reverse link capacity improvement," *IEEE Communications Letters*, vol.5, no. 4, pp. 138-141, April 2001.

Conference Publications

1. **W. Choi** and J. G. Andrews, "On the spatial multiplexing in Cellular MIMO CDMA systems with linear receivers," submitted to *IEEE Intl. Conf. on Commun.*, May 2005.
2. **W. Choi** and J. G. Andrews, "Improved Bit Error Probability Analysis for Maximal Ratio Combining in Asynchronous CDMA Channels", to appear in *IEEE Globecom*, Dallas, Tx, Dec. 2004.
3. **W. Choi** and J. G. Andrews, "Performance of the Delay Diversity Receiver in Asynchronous CDMA Channels", to appear in *IEEE Globecom*, Dallas, Tx, Dec. 2004.
4. **W. Choi** and J. G. Andrews, "Outage Probability for Maximal Ratio Combining in Asynchronous CDMA Channels", in *Proc. of IEEE Intl. Symp. on Spread Spectrum Tech. and App.*, Sydney, Australia, Sept. 2004.
5. E. H. Choi, **W. Choi**, and J. G. Andrews, "Throughput of the 1x EV-DO System with Various Scheduling Algorithms", in *Proc. of IEEE Intl. Symp. on Spread Spectrum Tech. and App.*, Sydney, Australia, Sept. 2004.
6. **W. Choi**, et al., "Throughput analysis of 1x EV-DO system with multi cells," in *Proc. of ITC-CSCC2002 (International Technical Conference on Circuit/Systems, Computer, and Communications)*, pp. 1924-1927, Phuket, Thailand, July 2002.
7. T. W. Ban, B. Y. Cho, **W. Choi**, and H. S. Cho, "DS/CDMA system with automatic on-off switching repeater," in *Proc. of IEEE Intl. Conf. on Commun.*, pp.780-784, June 2001.
8. **W. Choi** and J. Y. Kim, "Optimal transmission parameters of hopping pilot beacon for inter-frequency handoff in CDMA mobile cellular networks," in *Proc. of IEEE Veh. Technol. Conf.*, pp.2349-2353, May 2001.
9. **W. Choi** and J. Y. Kim, "Forward link capacity of 3G wideband CDMA system with mixed traffic sources," in *Proc. of IEEE Veh. Technol. Conf.*, pp.2620-2624, May 2001.
10. D. H. Kim, Y. N. Han, and **W. Choi**, "The capacity of TDD system in the FDD/TDD system sharing the same frequency," in *Proc. of APCC'00 (Asia Pacific Conference on Communication)*, pp. 769-773, Seoul, Korea, Oct.30-Nov.2, 2000.
11. **W. Choi** and J. Y. Kim, "Erlang Capacity of forward link for a multirate DS/CDMA system," in *Proc. of APCC'00 (Asia Pacific Conference on Communication)*, pp. 168-172, Seoul, Korea, Oct.30-Nov. 2, 2000.
12. **W. Choi** and J. Y. Kim, "Multiuser detection with multicarrier transmission for a DS/CDMA system in a multipath fading channel," in *Proc. of IEEE Intl. Sympo. on Personal, Indoor and Mobile Radio Commun.*, pp. 124-128, London, UK, Sep. 18-21, 2000.

13. **W. Choi** and J. Y. Kim, "Analysis of forward link capacity for a DS/CDMA system with multirate traffic sources," in *Proc. of ITC-CSCC'00 (International Technical Conference on Circuit/Systems, Computers, and Communications)*, pp. 125-128, Pusan, Korea, July 11-13, 2000.
14. **W. Choi** and J. Y. Kim, "Multiuser detection for multicarrier DS/CDMA system," in *Proc. of IEK Summer Academic Seminar*, pp. , Korea, June 23-24, 2000.
15. **W. Choi**, et al., "Forward link capacity analysis of the third generation CDMA system with multi-rate data and voice users," in *Proc. of IEEE 3Gwireless'00*, pp. 360-367, Silicon Valley, USA, June 14-16, 2000.
16. **W. Choi**, et al., "Forward link Erlang capacity of 3G CDMA system," in *Proc. of IEE 3G2000 (Mobile Communication Technologies)*, pp. 213-217, London, UK, March 27-29, 2000.
17. J. Y. Kim and **W. Choi**, "Performance of a multicarrier decorrelating multiuser receiver for a DS/CDMA system," in *Proc. of Pacific Rim Conference'99*, pp.520-524, Victoria BC, Canada, Dec. 1999.
18. **W. Choi**, Y. K. Cho, and J. H. Lee, "Performance of frequency domain multiuser detector for synchronous CDMA communication over Rician fading channel," in *Proc. of IEEE Veh. Technol. Conf.*, pp. 1725-1729, Ottawa, Canada, May18-21, 1998.

Patents

1. "Interference cancellation apparatus for microwave repeaters, filed with Korea Patent Office, No.10-2003-0000612, Jan 2003
2. "Base station and method for receiving and processing signal in the base station, filed with PCT Patent and Korea Patent Office, No.PCT/KR02/01620-10-20002-0021979.
3. "AFC for the multi-carrier CDMA system and method for the compensating of frequency error," registered, Korea Patent No.10-0344693-0000, July 2002.
4. "Repeater system having oscillation preventing function and automatic output disabling function for non-subscriber and control method thereof," registered, EU patent No.01104878.2-1246 Aprl. 2001.
5. "Repeater system having oscillation preventing function and automatic output disabling function for non-subscriber and control method thereof," filed with U.S. Patent Office.
6. "Method II for tracing phone location of a mobile communication CDMA," registered, Korea Patent No.10-287346-0000, Jan. 2001.
7. "Method I for tracing phone location of a mobile communication CDMA," registered, Korea Patent No.10-0272764-0000, Aug. 2000.

Professional Activities

- Reviewer for the following journals
 - *IEEE Trans. on Vehicular Technol.*, (2001 - present)
 - *IEEE Commun. Letters*, (2001 - present)
 - *IEEE Trans. on Commun.*, (2004 - present)
 - *IEEE Trans. on Wireless Commun.*, (2004 - present)
- Reviewer for the following conferences
 - *IEEE Vehicular Technol. Conf. (VTC)*
 - *IEEE Intl. Conf. on Commun. (ICC)*
 - *IEEE Global Telecom. Conf. (Globecom)*
 - *IEEE Intl. Symp. on Spread Spectrum Tech. and App. (ISSSTA)*
 - *IEEE Wireless Commun. and Network Conf. (WCNC)*
 - *IEEE Info. Symp. on Info. Theory (ISIT)*

- Memberships in Professional and Honorary Societies
 - Student Member, Institute of Electrical and Electronics Engineers (IEEE)

Computer Skill

- Programming Language: C, Pascal, Basic
- Hardware Language: Assembly (Motorola 68000, Intel 8086), VHDL
- Algorithm development environments: Maple, Mathematica, Matlab

Language Proficiencies

- Korean: Native fluency
- Standard American English: Fluency in reading, writing, listening and speaking

Visa Status F-1