

## Wayne Eric Stark

**Home Address:**

5277 Warren Road  
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**Personal Data:**

Birth Date: February 26, 1956  
Citizenship: U.S.A.

**Office Address:**

EECS Department  
The University of Michigan  
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**Positions Held:**

9/96-present: Professor of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor.  
9/88-9/96: Associate Professor of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor.  
9/82-9/88: Assistant Professor of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor.

**Education:**

Ph.D., Electrical Engineering, May 1982, University of Illinois.  
M.S., Electrical Engineering, August 1979, University of Illinois.  
B.S., Electrical Engineering, May 1978, University of Illinois. (Highest Honors).

**Honors and Awards:**

Journal of Communications and Networks Best Paper Award 2010.  
IEEE Military Communications Conference Ellersick Best Paper Award, 2009.  
IEEE Milcom Board 2002 Technical Achievement Award for sustained contributions to military communications.  
IEEE Fellow: 1997. For contributions to the theory and practice of coding and modulation in spread-spectrum systems.  
National Science Foundation Presidential Young Investigator 1985-1990.

**Governmental Grants and Contracts:**

2016-2017 NIST (\$50,000)  
2014-2016 NIST (\$100,000)  
2010-2011 KAUST (\$419,372, Co-PI with 2 others)  
2009-2013 NSF Grant (\$2,865,386 Co-PI with 5 others)  
2008 NSF MRI Grant (\$274,233, Co-PI with 2 others)  
2007 AFOSR Grant (\$140,000, Co-Pi with one other Co-PI)  
2004 JPL Grant (\$150,000)  
2002 ONR Grant (\$1,251,000)  
2000 NSF Grant (\$499,000, Demos Teneketzis, PI)  
2000 ONR Grant (\$247,000)  
2000 ARO Equipment Grant (\$168,000)  
1998-2000 DARPA Glomo Research Grant (\$200,000)  
1997-1999 DARPA Small Unit Operations Research Grant (\$500,000)  
1996-2000 Director: ARO Multidisciplinary University Research Initiative Grant entitled "Low Energy Electronics Design of Mobile Platforms" (\$5,000,000)  
1995-1999 ARO Multidisciplinary University Research Initiative Grant (\$4,000,000, George Haddad, PI)  
1995 ARO Equipment Grant (\$245,552)  
1995-2000 ARO Focused Research Initiative Grant (\$635,950)  
1992-1995 NSF Research Grant (\$284,711)  
1983-1985 NSF Initiation Grant (\$60,000)  
1985-1990 NSF Presidential Young Investigator Award (\$235,000)  
1986 NSF Equipment Grant (\$81,427)  
1985-1988 ONR Research Grant (\$247,668)

**Industrial Grants and Contracts:**

Ford, Hughes, TRW, General Electric, Ericsson, Raytheon (\$210,000)

**Professional Activities:**

*Member:* Editorial Board IEEE Journal on Selected Areas in Communications (JSAC) 2011-present  
*Guest Editor:* IEEE Journal on Selected Areas in Communications Special Issue on Advances in Military Networking and Communications, December 2011  
*Guest Editor:* IEEE Journal on Selected Areas in Communications Special Issue on Advances in Multicarrier CDMA, June 2006  
*Guest Editor:* IEEE Journal on Selected Areas in Communications Special Issue on Advances in Military Wireless Communications, May 2005.  
*Guest Editor:* IEEE Journal on Selected Areas in Communications Special Issue on Wideband CDMA II, June 2001  
*Guest Editor:* IEEE Journal on Selected Areas in Communications Special Issue on Wideband CDMA I, August 2000  
*Member:* NSF Wireless Technology Panel 1999

*Associate Editor:* IEEE Transactions on Communications 1984-1989

*Member:* IEEE Information Theory Society Board of Governors, 1985-1988.

*Reviewer:* IEEE, NSF, ARO.

*Co-organizer:* 1986 IEEE International Symposium on Information Theory, Ann Arbor, Michigan.

*Panel Member:* National Science Foundation Research Initiation Awards, 1985, 1992, 1995.

*Panel Member:* National Science Foundation Grant Awards, 1996.

*Consultant:* Irwin Magnetics, General Electric, InterDigital Communications Corporation, Intratech Systems Inc. Ericsson.

#### **Patents:**

- US Patent 9,772,397, *PMCW-PMCW interference mitigation*, September 26, 2017.
- US Patent 9,753,121, *Power control for improved near-far performance of radar systems*, September 5, 2017.
- US Patent 9,720,073, *Vehicular radar sensing system utilizing high rate true random number generator*, August 1, 2017.
- US Patent 9,689,967B1, *Adaptive transmission and interference cancellation for MIMO radar*, April, 2017.
- US Patent 9,575,160, *Vehicular radar sensing system utilizing high rate true random number generator*, February 21, 2017.
- US Patent 7,929,623, *FEC In Cognitive Multi-User OFDM*, April, 2011.
- US Patent 7,257,085, *Method and controller for data rate adaptation in wireless networks*, June 14, 2007.
- US Patent 6,282,181, *Pseudorandom number sequence generation in radio communication systems*, August 28, 2001.
- US Patent 6,240,538, *Method and apparatus for errors and erasures decoding*, May 5, 2001.
- US Patent 6,072,786, *Method for acquisition of spotbeam beacon frequency within a satellite communications system*, June 6, 2000.
- US Patent 6,028,538, *Method, keyboard and system for transmitting key characters*, Feb. 22, 2000.
- US Patent 5,938,787, *Communications systems and methods employing code rate partitioning with nonorthogonal modulation*, August 17, 1999.
- US Patent 4,796,110, *System and method for encoding and storing digital information on magnetic tape*, Jan. 3, 1989.

## Expert Witness Work

- Broadcom vs. Qualcomm, January 2005-April 2009. (Wilmer Hale, Boston MA). Represented Broadcom for infringement and validity of US Patent 5,657,317. Produced expert reports; was deposed and testified at trial. Produced expert reports for contempt proceedings; was deposed twice for contempt proceedings. (Case No. 8:05-CV-00467)
- DTL vs. Cingular, June 2006-November 2007. (Lerner, David, Littenberg, Krumholz & Mentlik, LLP, Westfield NJ). Represented DTL for infringement of US Patent 5,051,719. Produced expert reports for Markman hearing and infringement, was deposed for Markman hearing. (Case No. 2:06-CV-156)
- CSIRO vs. Microsoft, June 2007- April 2009. (Fish and Richardson). Represented Microsoft for noninfringement of US Patent 5,487,069. Produced expert report for noninfringement, was deposed on November 14, 2008. (Case No. 6:06-CV-549-LED)
- HTC Corporation et al vs. ICom GmbH & Co., KG, July 2009 -December 2009. (Kilpatrick Townsend). Represented ICom for infringement and validity of US Patent 5,390,216. Produced expert report prior to Markman hearing. Was deposed on December 18, 2009. Produced expert report on infringement. Was deposed on July 9, 2011. (Case No. 1:08-CV-01897-RMC) **Technology Involved:** Cellular Communication Systems.
- Apple vs. Samsung, May 2011-March 2013. (Wilmer Hale, Boston MA). Represented Apple for non-infringement and invalidity of US Patent 7,486,644 in the ITC. Produced noninfringement and invalidity reports. Was deposed in April 2012. Testified at International Trade Commission Hearing in June 2012. (Investigation No. 337-TA-794) **Technology Involved:** Cellular Communication Systems.
- Apple vs. Samsung, August 2012-December 2012. (Herbert Smith Freehills). Represented Apple for non-infringement and invalidity of Australian Patent 2005239657 in the Australian Court System. Produced various noninfringement and invalidity reports. Testified in the Australian Court in December 2012. (Case No. NSD 1243 of 2011) **Technology Involved:** Cellular Communication Systems.
- Apple vs. Samsung, May 2011-June 2012. (Wilmer Hale, Boston MA). Represented Apple for non-infringement and invalidity of 7,362,867 in the Northern District of California. Produced noninfringement and invalidity reports. Was deposed in April 2012. (Case No. 11-CV-01846-LHK.) **Technology Involved:** Cellular Communication Systems.
- Interdigital vs. Nokia, HTC, ZTE, January 2011-February 2013. (Wilson Sonsini). Represented Interdigital for infringement and validity of US Patent 7,616,970 in the International Trade Commission. Produced noninfringement and invalidity reports. Was deposed in December 2012. Testified at the hearing in February 2013. (Investigation No. 337-TA-800) **Technology Involved:** WiFi and Cellular Communication Systems.

- Interdigital vs. Samsung, March 2013-January 2014. (Latham Watkins). Represented Interdigital for infringement and validity of US Patent 7,616,970 in the International Trade Commission. Produced noninfringement and invalidity reports. Was deposed in September 2013. (Investigation No. 337-TA-868). **Technology Involved:** WiFi and Cellular Communication Systems.
- Ericsson vs. Adaptix, February 2013-December 2013. (Finnegan and Winston Strawn). Represented Ericsson for noninfringement and invalidity of US Patent 6,870,808 in the International Trade Commission. Produced noninfringement and invalidity reports. Was deposed in September 2013. (Investigation No. 337TA871). **Technology Involved:** Cellular Communication Systems.
- 2-way Computing vs. Sprint, December 2011-August 2015, (Case No. 2:11-CV-00012-JCM-PAL). (Knobbe Martin, Russ August & Kabat). Representing 2-Way Computing for infringement and validity of US Patent 5,434,797 in the District of Nevada. Produced infringement and validity reports. Was deposed in October 2013. **Technology Involved:** Cellular Communication Systems.
- Apple vs. CoreWireless, (Case No. 6:12-cv-0100). May 2012-March 2015 (Wilmer Hale, Boston MA). Representing Apple for non-infringement and invalidity of U.S. Patents 6,266,321, 6,978,143, 7,383,022, 7,599,664 in the Eastern District of Texas. Produced invalidity report and noninfringement report. Was deposed in May 2014. Testified at trial in March 2015. **Technology Involved:** Cellular Communication Systems.
- Ericsson vs. Intellectual Ventures, March 2014-On going (McDermott Will & Emery LLP). Representing Ericsson for Inter Partes Review of U.S. Patents 5,602,821, 5,963,557, 6,952,408, 6,370,153 Produced declarations for each of the Patents. Was deposed for the '408 Patent (March 2015), the '557 and '153 Patents (July 2015, November 2015) and '831 Patent (March 2016, August 2016). **Technology Involved:** Cellular Communication Systems.
- Adaptix, Inc. vs. Apple, Inc. and AT&T Mobility LLC, Case No. 3:13-cv-01777 (N.D. California), and Case No. 3:13-cv-02023 (N.D. California). 2013-2016 (Wilmer Hale, Cadwalder). Represented Apple and AT&T for noninfringement of US Patent 6,947,748 B2 and US Patent 7,454,212 B2 in Northern District of California. Produced noninfringement report. Deposed December 2014. **Technology Involved:** Cellular Communication Systems.
- California Institute of Technology v. Hughes Communications, Inc., et al., Case No. 2:13-cv-07245-MRP-JEM. 2014-2015 (Wilmer Hale). Represented Hughes in noninfringement of US Patent US Patent Nos. 7,116,710, 7,421,032, 7,916,781, and 8,284,833. **Technology Involved:** Satellite Communication Systems.
- Evolved Wireless LLC, v. Apple Inc, Case C.A. No. 15cv-542SLR-SRF, 2017-July 2017 (Boise Schiller, Flexner). Representing Apple regarding U.S. Patent Nos. 7,746,916 and 8,218,481. Wrote Invalidity report and Noninfringement report. Patents were dropped after Invalidity report was served. **Technology Involved:** Cellular Communication Systems.

- California Institute of Technology v. Broadcom Communications, Inc., et al., Case No. CV 16-3714-GW(AGRx) (Wilmer Hale). Represented Broadcom in noninfringement of US Patent US Patent Nos. 7,116,710, 7,421,032, 7,916,781, and 8,284,833. **Technology Involved:** WiFi.
- Apple v. Qualcomm, Case No., 3:17-CV-)00108-GPC-MDD. Represented Apple in noninfringement of various patents. **Technology involved:** Cellular communications.

**Consulting last 5 years (besides litigation related consulting):**

- Uhnder Inc; Automotive Radar.

**Sabbaticals:**

January-December 1989: IBM Zurich. Worked on radio communication systems including synchronization.  
 August, 1995-June 1996: Ericsson. Worked on various aspects of coding, modulation, acquisition for wireless communications (see several of the patents above).

September-December 2006: Microsoft. Worked on cognitive radio research.

September-December 2013: Home.

**Courses Taught:**

Electrical Engineering I (EECS 210, Undergraduate)

Probabilistic Methods In Engineering (EECS 301, 401, Undergraduate)

Analog Communication Signals and Systems (EECS 453, Undergraduate)

Digital Communication Signals and Systems (EECS 455, Undergraduate)

Information Theory (EECS 550, Graduate)

Introduction to Digital Communications and Coding (EECS 554, Graduate)

Digital Communication Theory (EECS 555, Graduate)

Communication Networks (EECS 557, Graduate)

Channel Coding Theory (EECS 650, Graduate)

Spread-Spectrum Communications and Applications Short Course given at University of Michigan, Summer 1993, 1994, 1995, 1996

Wireless Communication Camp for High School Students, Summer 2010, 2011

**Ph.D. Theses Supervised:**

1. Jae Hong Lee, "Information and Coding for Channels with Block Interference," 1986.
2. Bal Gi Kim, "Coding for Spread-Spectrum Communications Networks," 1987.
3. Abdolrahman Khalid Al Jabri, "Coding for Meteor-Burst Communications Channels and Side Information for Channels with Block Interference," 1987.
4. Ken Castor, "Parallel Decoding for Concatenated Coded Spread-Spectrum Frequency-Hopped Communications in Partial Band Jamming," 1987.

5. Sang Park, "Performance Analysis of Frequency-Hopped Spread-Spectrum Systems with Worst Case Jamming Interference," 1987.
6. Manjunath Hegde, "Performance Analysis of Coded Frequency-Hopped Spread-Spectrum Systems with Unknown Interference," 1987.
7. Amer Hassan, "Algorithms for Decoding Block Codes," 1989.
8. Whoon Cheun, "Analysis of Asynchronous Frequency-Hop Spread-Spectrum Multiple-Access Networks," 1989.
9. Brian Woerner, "Coded Modulation for Direct-Sequence Spread-Spectrum Communications," 1991.
10. Michael McKinley, "Channel Coding to Exploit Soft-Decisions and Error Dependence in Channels with Memory," 1992.
11. Yi-Pin Wang, "On the Performance of DS/SS Systems in Bandlimited Multipath Environments," 1995.
12. Majari Asawa, "Optimal Scheduling and Admission Control in Communication Networks," 1995.
13. Matthew Klimesh, "Optimal Strategies for Communicator-Jammer Problems," 1995.
14. Mohamed Adnan Landolsi, "Performance of DS-CDMA Communication Systems with Generalized Offset QPSK," 1996.
15. Dennis Goeckel, "Performance Limits and Optimal Resource Allocation for Coded Mult-User Communication Systems," 1996.
16. Abdulrauf Hafeez, "Trellis and Tree Search Algorithms for Equalization and Multiuser Detection," 1999.
17. Joseph Kang, "Iterative Estimation and Decoding for Channels with Memory," 1999.
18. Michael Chu "Performance and Modeling of Communications in Channels with Memory," 1999.
19. Victor Wen-Kai Cheng, "Trellis Coded Spread-Spectrum Modulation Schemes with Multiple-Access Interference and Coded Modulation Schemes in a Fading Environment," 1999.
20. Sangjin Hong, "Performance Driven VLSI System Design For Low Energy Wireless Communications," 1999.
21. Je-Hong Jong, "Performance and Power Optimization of Multicarrier Communication Systems in the Presence of Nonlinear Distortion," 2000.

22. Cheng-Po Liang, "Resource Allocation and System Optimization for Spread-Spectrum and OFDM Networks with Multiuser Detection," 2001.
23. Tingfang Ji, "Adaptive Coding for Wireless Data Networks," 2001.
24. Andrew Worthen "Codes and Iterative Receivers for Wireless Communication Systems," 2001.
25. Troy Nolan, "Coding Optimization and Nonlinear Receiver Analysis for Wireless Communication Systems in the Presence of Interference," 2001.
26. Do-Sik Yoo, "Channel Characterization and System Design In Wireless Communications," 2002.
27. Ali Zilmaz, "Performance of Turbo Codes: The Finite Length Case," 2003.
28. John Choi, "Performance of Ultra-Wideband Communication Systems," 2003.
29. Salam Zummo, "Coding and Channel Estimation for Block Fading Channels," 2003.
30. Hua Wang, "Analysis and Design of Efficient Wireless Networks," 2004.
31. Ping-Cheng Yeh, "Performance of Wireless Networks with Directional Antennas," 2005.
32. Shihyu Chang, "Generating Function Analysis of Wireless Networks and ARQ Systems," 2006.
33. Kar-Peo Yar, "Design and Analysis of Short Packet and Concatenated Coded Communications Systems," 2007.
34. Jinho Kim, "Performance Analysis of Physical Layer Network Coding," 2009.
35. Chih-Wei Wang, "Multilevel Coding and Unequal Error Protection for Multiple-Access Communications and Ultra-Wideband Communications in the Presence of Interference," 2009.
36. Changhun Bae, "Energy-Bandwidth Tradeoff in Wireless Networks," 2010.
37. Sanghoon Kim, "Cross Layer Analysis and Optimization of Relay Networks ," 2013.
38. Sungjoon Park, "System Design and Outage Analysis for Cooperative Diversity Wireless Networks," 2013.
39. Shao-Yuan Chen, "Detection, Synchronization, Channel Estimation and Capacity in UWB Sensor Networks using Compressed Sensing," 2014.

**University Service:**

*Chair:* Promotion committee for an Associate Professor (2011).

*Member:* Budget Study Committee (2009)

*Member:* Recreational Sports Task Force (2008)



*Director:* Communications and Signal Processing Laboratory (2000-present)  
*Member:* Senate Advisory Committee on University Affairs (2007-2010)  
*Member:* Senate Assembly (2005-2010)  
*Member:* Administrator Evaluation Committee (2004-2006)  
*Member:* Academic Affairs Advisory Committee (2004-2006)  
*Director:* Communications and Signal Processing Laboratory (9/1/2000-present)  
*Undergraduate Advisor:* Electrical Engineering Program (9/1/2001-8/31/2004)  
*Associate Chair:* Electrical Engineering and Computer Science Department (10/1997-8/1/2000). Was the leader of the Systems Faculty (around 20 faculty) overseeing teaching assignments, service assignments, faculty raises and staff.  
*Chair:* Search Committee for Communication Area, 9/1/1999-5/1/2000, 9/2004-2006  
*Chair:* Graduate Affairs Committee (1995-1996).  
*Chair:* Electrical Engineering Systems Graduate Program (1990-1994).  
*Chair:* College of Engineering Nominating Committee, 1993  
*Chair:* Promotion/Tenure committee for an Assistant Professor.  
*Member:* Systems Faculty Search Committee, 1993-1995  
*Member:* College of Engineering Nominating Committee, 1992  
*Member:* Michigan State Police Communications System review committee for University President and Governor, State of Michigan, 1/92-5/92.  
*Member:* Electrical Engineering Systems Graduate Committee (1985-1994)  
*Member:* Financial Aid and Recruiting Committee (1986-1987)  
*Member:* Computing Needs Committee (1986-1987)  
*Member:* Systems Science and Engineering Executive Committee (1986-1987)

## Publications

### Chapters in Books

- [1] M. V. Hegde and W. Stark, "Orthogonal signalling and diversity in partial-band interference," in *Advances in Communications and Signal Processing*, W. A. Porter and S. Kak, editors, pp. 71–82, Springer-Verlag, 1988.
- [2] D. Borth, J. S. Lehnert, and W. E. Stark, "Principles of telecommunications," in *1997 Encyclopedia Britannica*, volume 28, pp. 487–493, Encyclopedia Britannica, 1997.
- [3] W. Stark and L. Milstein, "Wireless communications system architecture and performance," in *RF Technologies for Low Power Wireless Communications*, pp. 9–38, Wiley Interscience, New York, 2001.
- [4] W. E. Stark, "Effects of multipath fading in wireless communication systems," in *The RF and Microwave Handbook*, pp. 9–44–9–61, CRC Press, 2001.
- [5] J. East, W. E. Stark, and G. I. Haddad, "Characterization of amplifier nonlinearities and their effect in communication systems," in *RF Technologies for Low Power Wireless Communications*, pp. 229–263, Wiley, 2001.
- [6] A. Worthen and W. Stark, "On the channel memory-diversity tradeoff in communication systems," in *Information, Coding and Mathematics*, pp. 221–238, Kluwer Academic Publishers, 2002.

### Journal Articles

- [7] T. Song, W. E. Stark, T. Li, and J. K. Tugnait, "Optimal multiband transmission under hostile jamming," *IEEE Transactions on Communications*, vol. 64, no. 9, pp. 4013–4027, 2016.
- [8] S. Kim and W. Stark, "Cross-layer analysis of energy-throughput tradeoff for relay networks," *IEEE Transactions on Wireless Communications*, vol. 13, no. 12, pp. 6716–6726, 2014.
- [9] O. Khan, S.-Y. Chen, D. D.D. Wentzloff, and W. Stark, "Impact of compressed sensing with quantization on UWB receivers with multipath channel estimation," *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, vol. 2, no. 3, pp. 460–469, Sept 2012.
- [10] C.-L. Chen, W. Stark, and S.-G. Chen, "Energy-bandwidth efficiency tradeoff in MIMO multi-hop wireless networks," *IEEE Journal on Selected Areas in Communications*, vol. 29, no. 8, pp. 1537–1546, September 2011.
- [11] C. Bae and W. E. Stark, "Minimum energy-per-bit wireless multi-hop networks with spatial reuse," *Journal on Communications and Networks*, vol. 12, no. 2, pp. 103–113, April 2010.

- [12] D.-S. Yoo, W. Stark, K.-P. Yar, and S.-J. Oh, "Coding and modulation for short packet transmission," *IEEE Transactions on Vehicular Technology*, vol. 59, no. 4, pp. 2104–2109, May 2010.
- [13] C. Bae and W. E. Stark, "End-to-end energy-bandwidth tradeoff in multi-hop wireless networks," *IEEE Transactions on Information Theory*, vol. 55, no. 9, pp. 4051–4066, November 2009.
- [14] S. Zummo, P.-C. Yeh, and W. Stark, "New union bound on the error probability of bit-interleaved space-time codes with finite interleaver sizes," *IET Communications*, vol. 2, no. 10, pp. 1230–1238, November 2008.
- [15] S. Y. Chang, W. E. Stark, and A. Anastasopoulos, "Energy-delay analysis of MAC protocols in wireless networks," *IEEE Transactions on Communications*, vol. 7, no. 8, pp. 2841–2845, August 2008.
- [16] K.-P. Yar, D.-S. Yoo, and W. Stark, "Performance of RS coded M-ary modulation with and without symbol overlapping," *IEEE Transactions on Communications*, vol. 56, no. 3, pp. 445–453, March 2008.
- [17] P.-C. Yeh, W. Stark, and S. Zummo, "Performance analysis of wireless networks with directional antennas," *IEEE Transactions on Vehicle Technology*, vol. 57, no. 5, pp. 3187–3199, September 2008.
- [18] P. Richardson, W. Xiang, and W. Stark, "Modeling of ultra-wideband channels within vehicles," *IEEE Journal on Selected Areas in Communications*, vol. 24, no. 4, pp. 906–912, April 2006.
- [19] P.-C. Yeh, S. A. Zummo, and W. Stark, "Error probability of bit-interleaved coded modulation in wireless environments," *IEEE Transactions on Vehicular Technology*, vol. 55, no. 2, pp. 722–728, March 2006.
- [20] S. Zummo and W. E. Stark, "Error probability of coded STBC systems in block fading environments," *IEEE Transactions on Wireless Communications*, vol. 5, pp. 972–977, 2006.
- [21] S. Zummo and W. E. Stark, "Performance analysis and iterative decoding of I-Q trellis space-time codes," *IEE Proceedings-Communications*, vol. 153, no. 2, pp. 233–237, April 2006.
- [22] D.-S. Yoo and W. E. Stark, "Characterization of WSSUS channels: Normalized mean square covariance," *IEEE Transactions on Wireless Communications*, vol. 4, pp. 1575–1584, July 2005.
- [23] D.-S. Yoo and W. E. Stark, "Characterization of WSSUS channels: Normalized mean square covariance and diversity combining," *IEEE Transactions on Wireless Communications*, vol. 4, pp. 1307–1310, July 2005.
- [24] D.-S. Yoo and W. E. Stark, "Characterization of multipath fading channels: Channels with specular components," *IEEE Transactions on Wireless Communications*, vol. 4, pp. 1471–1482, July 2005.
- [25] T. Ji and W. E. Stark, "Rate-adaptive transmission over correlated fading channels," *IEEE Transactions on Communications*, vol. 53, no. 10, pp. 1663–1670, October 2005.

- [26] S. Hong, S. Kim, and W. E. Stark, "Low power application-specific parallel-pipeline multiplier design for DSP applications through coefficient optimization," *VLSI Design: An International Journal of Custom-Chip Design, Simulation, and Testing*, vol. 14, no. 3, pp. 287–298, March 2002.
- [27] J. Choi, D.-S. Yoo, and W. E. Stark, "Performance limits of M-FSK with Reed-Solomon coding and diversity combining," *IEEE Transactions on Communications*, vol. 50, no. 11, pp. 1787–1797, November 2002.
- [28] J. Choi and W. E. Stark, "Performance of ultra-wideband communications with suboptimal receivers in multipath channels," *IEEE Journal on Selected Areas in Communications*, vol. 20, no. 9, pp. 1754–1766, Dec. 2002.
- [29] M. Landolsi and W. E. Stark, "On the accuracy of Gaussian approximations in the error analysis of DS-CDMA with OQPSK modulation," *IEEE Transactions on Communications*, vol. 50, no. 12, pp. 2065–2071, Dec. 2002.
- [30] M. Landolsi and W. E. Stark, "The effects of filtering and nonlinear amplification on the performance of DS-CDMA with OQPSK-type modulations," *IEEE Transactions on Vehicular Technology*, vol. 51, no. 5, pp. 1145–1152, Sep. 2002.
- [31] W. E. Stark, H. Wang, A. Worthen, S. Lafortune, and D. Teneketzis, "Low energy wireless communication network design," *IEEE Wireless Communication Magazine*, vol. 9, pp. 60–72, August 2002.
- [32] P. Kabamba, S. Meerkov, W. E. Stark, and C. Y. Tang, "Feedforward control of data rate in wireless networks," *IEEE Transactions on Vehicular Technology*, vol. 51, no. 5, pp. 1206–1222, September 2002.
- [33] J.-H. Jong and W. E. Stark, "Performance analysis of coded multicarrier spread-spectrum systems in the presence of multipath fading and nonlinearities," *IEEE Transactions on Communications*, vol. 49, no. 1, pp. 168–179, January 2001.
- [34] C.-P. Liang and W. E. Stark, "Iterative multiuser detection for turbo-coded FHMA communications," *IEEE Journal on Selected Areas in Communications*, vol. 19, pp. 1810–1819, September 2001.
- [35] A. P. Worthen and W. E. Stark, "Unified design of iterative receivers using factor graphs," *IEEE Transactions on Information Theory*, vol. 47, pp. 843–849, February 2001.
- [36] M. J. Chu and W. E. Stark, "Effect of mobile velocity on communications in fading channels," *IEEE Transactions on Vehicular Technology*, vol. 49, pp. 202–210, January 2000.
- [37] T. Ji and W. Stark, "Turbo-coded ARQ schemes for DS-CDMA data networks over fading and shadowing channels: Throughput, delay, and energy efficiency," *IEEE Journal on Selected Areas in Communications*, pp. 1355–1364, August 2000.

- [38] J. Kang and W. E. Stark, "Iterative estimation and decoding for FH-SS with slow Rayleigh fading," *IEEE Transactions on Communications*, vol. 48, pp. 2014–2023, December 2000.
- [39] D. L. Goeckel and W. E. Stark, "Optimal diversity allocation in multiuser communication systems-Part II: Optimization," *IEEE Transactions on Communications*, pp. 45–52, January 2000.
- [40] S. Hong and W. E. Stark, "Design and implementation of a low complexity VLSI turbo-code decoder architecture for low energy mobile wireless communications," *Journal of VLSI Signal Processing*, vol. 24, pp. 43–57, February 2000.
- [41] D. L. Goeckel and W. E. Stark, "Optimal diversity allocation in multiuser communication systems-Part I: Systems model," *IEEE Transactions on Communications*, vol. 47, pp. 1828–1836, December 1999.
- [42] M. A. Landolsi and W. E. Stark, "DS-CDMA chip waveform design for minimal interference under bandwidth, phase, and envelope constraints," *IEEE Transactions on Communications*, vol. 47, pp. 1737–1746, August 1999.
- [43] C.-P. Liang, J.-H. Jong, W. E. Stark, and J. R. East, "Nonlinear amplifier effects in communications systems," *IEEE Transactions on Microwave Theory and Techniques*, pp. 1461–1466, August 1999.
- [44] D. Goeckel, A. O. Hero, and W. E. Stark, "Data-recursive algorithms for blind channel identification in direct-sequence systems," *IEEE Transactions on Signal Processing*, vol. 46, pp. 2217–2220, August 1998.
- [45] A. Hafeez and W. E. Stark, "Decision feedback sequence estimation for unwhitened ISI channels with applications to multiuser detection," *IEEE Journal on Selected Areas in Communications: Special Issue on Signal Processing for Wireless Communications*, vol. 16, no. 9, pp. 1785–1795, December 1998.
- [46] J. H. Kang and W. E. Stark, "Turbo codes for noncoherent FH-SS with partial-band interference," *IEEE Transactions on Communications*, vol. 46, pp. 1451–1458, November 1998.
- [47] S. W. Kim and W. E. Stark, "Performance limits of Reed-Solomon coded CDMA with orthogonal signalling in a Rayleigh faded channel," *IEEE Transactions on Communications*, vol. 46, pp. 1125–1134, September 1998.
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