

ANDRÉS KWASINSKI, PH. D.

axkeec@rit.edu

<http://www.ce.rit.edu/~axkeec>

EDUCATION

- Ph.D., Electrical and Computer Engineering,** November 2004
University of Maryland, College Park.
Dissertation: Cross-Layer Resource Allocation Protocols for Multimedia
CDMA Networks.
Advisor: Professor Nariman Farvardin.
- M.Sc., Electrical and Computer Engineering,** December 2000
University of Maryland, College Park.
- Electrical Engineer (Ingeniero Electrónico),** December 1992
Instituto Tecnológico de Buenos Aires (ITBA), Argentina.

EMPLOYMENT

- Associate Professor** Jul. 2013 – Present
Assistant Professor Aug. 2008 – Jun. 2013
Rochester Institute of Technology, Rochester, NY.
Department of Computer Engineering
Kate Gleason College of Engineering
- Software Design Engineer** Sep. 2006 – Aug. 2008
Texas Instruments Inc.
Wireless Infrastructure Group, Germantown, MD
- Postdoctoral Research Associate** Nov. 2004 – Sep. 2006
University of Maryland, College Park, MD.
Department of Electrical and Computer Engineering and
Institute for Systems Research (ISR)
- Laboratory Manager** Nov. 2000 – Sep. 2006
University of Maryland, College Park, MD.
Communication and Signal Processing Laboratory
- Graduate Research Assistant** Aug. 1998 – Nov. 2004
University of Maryland, College Park, MD.
Department of Electrical and Computer Engineering
- Graduate Teaching Assistant** Fall 1998, Spring 1999,
Spring 2004
University of Maryland, College Park, MD.
Department of Electrical and Computer Engineering

Senior Product Training Specialist Lucent Technologies, Buenos Aires, Argentina	1995-1998
Junior Engineer AT&T, Buenos Aires, Argentina	1994
Junior Engineer Pecom-NEC, Buenos Aires, Argentina	1993
Laboratory Assistant Buenos Aires Institute of Technology, Buenos Aires, Argentina Applied Digital Electronics Group (GEDA)	1992 – 1998
Teaching Assistant Buenos Aires Institute of Technology, Buenos Aires, Argentina Department of Electrical Engineering	1990 – 1993

PROFESSIONAL ACTIVITIES

• Professional Service:

- Editor (2016-Present):
 - IEEE Wireless Communications Letters.
- Area Editor:
 - IEEE Signal Processing Magazine, Columns and Forums (2012-2014).
 - IEEE Signal Processing Magazine, Outreach and Social Media (2015-present).
- Chair (2014-Present):
 - IEEE Signal Processing Society Online Content and Social Media Ad Hoc Committee.
- Editor (2011-2016):
 - IEEE Transactions on Wireless Communications.
- Associate Editor (2008-2011):
 - IEEE Signal Processing Magazine, “InTheSpotlight” column.
- Guest Editor:
 - IEEE Journal of Selected Topics in Signal Processing, special issue on Signal Processing in Cooperative Cognitive Radio Systems (published January 2011).
- Chair (2010-2012) - IEEE Multimedia Communications Technical Committee, Interest Group on Distributed and Sensor Networks for Mobile Media Computing and Applications.

- Conference Organizing Committee Member:
 - 2010 IEEE GLOBECOM – Workshops Co-Chair.
 - 2010 IEEE GLOBECOM – Publicity Co-Chair.
 - 2011 IEEE ICCCN – Tutorials Co-Chair.
 - 2012 IEEE ICCCN – Publicity Co-Chair.
 - 2012 ICNC – Invited Papers Co-Chair.
 - 2013 IEEE ICME - Industrial/Short Papers Co-Chair.
 - 2017 IEEE ICIP – Social Media Chair.
- Treasurer: IEEE Argentina, Computer Society chapter (1998).
- Member: Buenos Aires Institute of Technology, Department of Electrical Engineering Advisory Board (2009-2016).

PUBLICATIONS

Patents

A. Kwasinski, R. Katzur, V. Sundararajan and B. Johnson, "Method, System and Apparatus for Generating Constant Amplitude, Zero Autocorrelation Sequences". Patent number, 7965797, Issued Jun 21, 2011.

Books

P. Cosman, A. Kwasinski and V. Chande, "Joint Source-Channel Coding", Wiley, finalizing writing, (450 pages).

G.-M. Su, Y.-C. Lai, A. Kwasinski and H. Wang, "3D Visual Communication", Wiley, 2013, (450 pages).

K. J. R. Liu, A. K. Sadek, W. Su, A. Kwasinski, "Cooperative Communications and Networking", Cambridge University Press, 2009, (650 pages).

Journals

- [1] Wang, W.; Kwasinski, A., Niyato, D.; Han, Z.; "A Survey on Applications of Model-Free Strategy Learning in Cognitive Wireless Networks," *IEEE Communications Surveys and Tutorials*, vol. 18, no. 3, pp. 1717-1757, 2016.
- [2] Youngsung Kwon, Alexis Kwasinski, and Andres Kwasinski; "Coordinated Energy Management in Resilient Microgrids for Wireless Communication Networks", *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 4, no. 4, pp. 1158-1173, 2016.
- [3] Kwasinski, A.; Kwasinski, A., "Increasing sustainability and resiliency of cellular network infrastructure by harvesting renewable energy," *IEEE Communications Magazine*, vol.53, no.4, pp.110-116, April 2015.

- [4] V. Vijayakumaran, N. Nerurkar, A. Ganguly and A. Kwasinski, "CDMA Enabled Wireless Network-on-Chip," *ACM Journal of Emerging Technologies in Computing Systems (JETC)*, vol. 10, no. 4, pp. 28:1-28:20, May 2014.
- [5] H. Tuncer, A. Kwasinski, and N. Shenoy, "Performance Analysis of Virtual Mobility Domain Scheme vs. IPv6 Mobility Protocols," *Computer Networks*, vol. 57, no. 13, pp. 2578-2596, September 2013.
- [6] A. Kwasinski and A. Kwasinski, "Signal Processing in the Electrification of Vehicular Transportation: Techniques for Electric and Plug-In Hybrid Electric Vehicles on the Smart Grid," *IEEE Signal Processing Magazine*, vol.29, no.5, pp.14-23, Sept. 2012.
- [7] G-M Su, Y-C Lai, A. Kwasinski, and H. Wang, "3D Video Communications Challenges and Opportunities", *Wiley International Journal of Communication Systems*, vol. 24, Issue 10, pp. 1261-1281, October 2011.
- [8] K. Seddik, A. Kwasinski and K. J. R. Liu, "Asymptotic Distortion Performance of Source-Channel Diversity over Multi-hop and Relay Channels", *IEEE Transactions on Mobile Computing*, , vol. 9, issue 2, pp. 270-287, Feb. 2010.
- [9] A. El Sherif, A. Kwasinski, A. K. Sadek, K. J. Ray Liu, "Content-Aware Cooperative Multiple Access Protocol for Packet Speech Communications", *IEEE Transactions on Wireless Communications*, vol. 8, issue 2, pp. 995-1005, Feb. 2009.
- [10] A. Kwasinski and K. J. R. Liu, "Source-Channel-Cooperation Tradeoffs for Adaptive Coded Communications", *IEEE Transactions on Wireless Communications*, vol. 7, issue 9, pp. 3347 -3358, Sept. 2008.
- [11] A. Kwasinski and K. J. R. Liu, "Towards a Unified Framework for Modeling and Analysis of Diversity in Joint Source-Channel Coding", *IEEE Transactions on Communications*, vol. 56, issue 1, pp. 90-101, Jan. 2008.
- [12] Z. Han, G-M. Su, A. Kwasinski, M. Wu, K. J. R. Liu, "Multiuser Distortion Management of Layered Video over Resource Limited Multicode-CDMA", *IEEE Transactions on Wireless Communications*, vol. 5, issue 11, pp. 3056-3067, Nov. 2006.
- [13] Z. Han, A. Kwasinski and K. J. Ray Liu, "Downlink Resource Allocation for Multimedia CDMA Networks Based on Real-Time Dynamic Joint Source Channel Coding", *IEEE Transactions on Communications*, vol. 54, issue 9, pp. 1682-1692, Sept. 2006.
- [14] A. Kwasinski, M. Alasti, K. J. R. Liu, N. Farvardin, "A Low Complexity Source Encoding Assisted Multiple Access Protocol for Voice/Data Integrated Networks", *EURASIP Journal on Applied Signal Processing*, vol. 2005, issue 2, pp. 193-206, 2005.

Conferences

- [1] Wenbo Wang, Pengda Huangy, Peizhao Hu, Jing Na and Andres Kwasinski, "Learning in Markov Game for Femtocell Power Allocation with Limited Coordination," in *IEEE Global Communications Conference (GLOBECOM)*, pp. 1-6, Washington DC, December 2016.

- [2] R. Hu, A. Kwasinski, A. Kwasinski, "Mixed Strategy Communication Traffic Shaping Method for Decentralized Energy Management of Cell Sites", in *International Telecommunications Energy Conference (INTELEC)*, pp. 1-8, Austin, TX, October 2016.
- [3] Kwasinski, A.; Kwasinski, A., "Tradeoff Between Quality-of-Service and Resiliency: a Mathematical Framework Applied to LTE Networks," in *Second International Workshop on Integrating Communications, Control, and Computing Technologies for Smart Grid (ICT4SG), IEEE International Conference on Communications (ICC)*, pp. 348-353, Kuala Lumpur, Malaysia, May 2016.
- [4] Kwasinski, A.; Kwasinski, A., "The Role of Multimedia Source Codecs in Green Cellular Networks" in *IEEE Wireless Communications and Networking Conference (WCNC)*, pp. 1-6, Doha, Qatar, April 2016.
- [5] Kwasinski, A.; Kwasinski, A., "Resiliency in the Sustainability of Distributed Green Data Centers" (invited) in *Sixth International Green and Sustainable Computing Conference, workshop on Energy-efficient Networks of Computers (E2NC)*, December 2015.
- [6] Hartpence, B.; Kwasinski, A., "Performance evaluation of networks with physical and virtual links," in *Global Information Infrastructure and Networking Symposium (GIIS)*, pp. 1-6, Guadalajara, Mexico, 28-30 Oct. 2015.
- [7] Youngsung Kwon, Alexis Kwasinski, and Andres Kwasinski, "Microgrids for Base Stations: Renewable Energy Prediction and Battery Management for Effective State of Charge Control," *IEEE 37th International Telecommunications Energy Conference (INTELEC)*, pp. 1-8, Osaka, 2015.
- [8] Wenbo Wang; Kwasinski, A., "Adaptive learning for scalable video transmission with HARQ over dynamic wireless channels," in *IEEE International Conference on Communications (ICC)*, pp. 3094-3099, London, 8-12 June 2015.
- [9] Kwasinski, A.; Kwasinski, A., "Integrating cross-layer LTE resources and energy management for increased powering of base stations from renewable energy," in *13th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)*, pp. 498-505, Mumbai, 25-29 May 2015.
- [10] Shenoy, N.; Hamilton, J.; Kwasinski, A.; Kaiqi Xiong, "An improved IEEE 802.11 CSMA/CA medium access mechanism through the introduction of random short delays," in *13th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)*, pp. 331-338, Mumbai, 25-29 May 2015.
- [11] Wenbo Wang; Andres Kwasinski; Alexis Kwasinski, "Resource Allocation in Self-Sustainable Green Wireless Networks with Combinatorial Auction", *IEEE Global Telecommunications Conference (IEEE GLOBECOM)*, pp.2703-2708, Austin, TX, 8-11 Dec. 2014.
- [12] Andres Kwasinski; Alexis Kwasinski, "Traffic Management for Sustainable LTE Networks", *IEEE Global Telecommunications Conference (IEEE GLOBECOM)*, pp.2520-2525, Austin, TX, 8-11 Dec. 2014.
- [13] Alexis Kwasinski; Andres Kwasinski, "Role of energy storage in a microgrid for increased use of photovoltaic systems in wireless communication networks," *IEEE 36th International Telecommunications Energy Conference (INTELEC)*, pp.1-8, Sept. 28 2014-Oct. 2, 2014.

- [14] Wenbo Wang; Kwasinski, A.; Zhu Han, "Power allocation with Stackelberg game in femtocell networks: A self-learning approach," *Eleventh Annual IEEE International Conference on Sensing, Communication, and Networking (SECON)*, pp.354-362, June 30 2014-July 3 2014.
- [15] Alexis Kwasinski; Andres Kwasinski, "Operational aspects and power architecture design for a microgrid to increase the use of renewable energy in wireless communication networks," *International Power Electronics Conference (IPEC-Hiroshima 2014 - ECCE-ASIA)*, pp. 2649-2655, 18-21 May 2014.
- [16] Wenbo Wang; Kwasinski, A.; Zhu Han, "A routing game in Cognitive Radio Networks against Routing-toward-Primary-User Attacks," *IEEE Wireless Communications and Networking Conference (WCNC)*, pp.2510-2515, 6-9 April 2014.
- [17] Wenbo Wang; Kwasinski, A.; Zhu Han, "Routing based on layered stochastic games for multi-hop cognitive radio networks," *IEEE Wireless Communications and Networking Conference (WCNC)*, pp.63-68, 6-9 April 2014.
- [18] W. Wang, A. Kwasinski, "Distributed cross-layer resource allocation using Correlated Equilibrium based stochastic learning," *IEEE Wireless Communications and Networking Conference (WCNC)*, pp. 1727-1732, 2013.
- [19] A. Kwasinski, "Joint source-channel coding for delay-constrained iterative resource allocation algorithms," *IEEE Wireless Communications and Networking Conference (WCNC)*, pp. 813-818, 2013.
- [20] A. Kwasinski, A. Kwasinski, "Architecture for green mobile network powered from renewable energy in microgrid configuration," *IEEE Wireless Communications and Networking Conference (WCNC)*, pp. 1273-1278, 2013.
- [21] H. Tuncer, N. Shenoy, A. Kwasinski, J. Hamilton and S. Mishra, "A Novel User-centric Handoff Cost Framework Applied to the Virtual Mobility Domains and IPv6-based Mobility Protocols", *IEEE Global Telecommunications Conference (IEEE GLOBECOM 2012)*, pp.2578-2584, 3-7 Dec. 2012.
- [22] C. Merkel, D. Kudithipudi, A. Kwasinski, "Lightweight Energy Prediction Framework for Solar-Powered Wireless Sensor Networks", *IEEE International System-on-Chip Conference (SoCC 2012)*, pp.131,136, 12-14 Sept. 2012.
- [23] A. Vidapalapati, V. Vijayakumaran, A. Ganguly, A. Kwasinski "Network-on-Chip architectures with adaptive CDMA based wireless links" *Proceedings of the IEEE International Symposium on Circuits and Systems (ISCAS)*, Seoul, Korea, May 21-23, 2012.
- [24] F. Jenner, A. Kwasinski, "Highly Accurate Non-Intrusive Speech Forensics for Codec Identifications from Observed Decoded Signals", *Proc. of 2012 IEEE International Conference on Audio, Speech and Signal Processing (ICASSP)*, March 2012.
- [25] W. Wang, A. Kwasinski, "Experience Cooperative Sharing in Cross-Layer Cognitive Radio for Real-Time Multimedia Communication" (invited), in *Proc. of 4th. International Conference on Cognitive Radio and Advanced Spectrum Management (CogART)*, ACM, Article 55, 5 pages, Rome, Italy, November 2011.

- [26] D. Layerle, A. Kwasinski, "A Power Efficient Pulsed MAC Protocol for Body Area Networks", in *Proc. 22nd IEEE Personal Indoor Mobile Radio Communications (PIMRC'11)*, September 2011.
- [27] A. Kwasinski, W. Wang "Cooperative Learning for Reduced Complexity Cross-Layer Cognitive Radio", in *Proc. 22nd IEEE Personal Indoor Mobile Radio Communications (PIMRC'11)*, September 2011.
- [28] X. Fiss, A. Kwasinski, "Automatic Real-Time Electric Guitar Audio Transcription", *Proc. of 2011 IEEE International Conference on Audio, Speech and Signal Processing (ICASSP)*, May 2011.
- [29] N. Horner, A. Kwasinski, and A. Mondragon, "Improving the Performance of DSP Systems for MIMO Processing", *Proc. of 2011 IEEE International Conference on Audio, Speech and Signal Processing (ICASSP)*, May 2011.
- [30] A. Kwasinski, "In-class Demonstrations with a Portable Laboratory for Teaching DSP to Computer Engineering Majors", *Proc. of 2011 IEEE International Conference on Audio, Speech and Signal Processing (ICASSP)*, May 2011.
- [31] C. Merkel, D. Kudithipudi and A. Kwasinski, "Lightweight Energy Prediction Filters for Solar-Powered Wireless Sensor Networks", in *6th International Workshop on Unique Chips and Systems (UCAS-6)*, Atlanta, GA, December 2010.
- [32] W. Wang, A. Kwasinski, "Feedback-based Cooperative Primary Channel Activity Estimation for Dynamic Spectrum Access", in *3rd International Workshop on Cognitive Radio and Advanced Spectrum Management*, Rome, Italy, Nov. 2010.
- [33] A. Kwasinski, D. Kudithipudi, "Towards Integrated Circuit Thermal Profiling for Reduced Power Consumption: Evaluation of Distributed Sensing Techniques", in *Proceedings of Workshop on Work in Progress in Green Computing*, Chicago, Aug 16-18, 2010.
- [34] A. Kwasinski, "Transmission of TCP Traffic Over User Cooperative Communications in Infrastructure Networks", *Proc. of 2010 IEEE Wireless Communications and Networking Conference (WCNC)*, April 2010.
- [35] A. Kwasinski, "Enabling User Cooperation Through Embedded Coding and Awareness of Source Content Dynamics", *Proc. of 2010 IEEE International Conference on Audio, Speech and Signal Processing (ICASSP)*, March 2010.
- [36] K. Ho, A. Kwasinski, "Uplink Channel Estimation in WiMAX," *Proc. of 2009 IEEE Wireless Communications and Networking Conference (WCNC)*, pp.1-6, April 2009.
- [37] K. G. Seddik, A. Kwasinski and K. J. R. Liu, "Asymptotic Distortion Performance of Source-Channel Diversity Schemes over Relay Channels", in *Proceedings of IEEE Wireless Communications and Networking Conference (WCNC)*, pp. 1245-1250, March 2008.
- [38] A. El Sherif, A. Kwasinski, A. K. Sadek and K. J. R. Liu, "Content-Aware Cooperative Multiple Access Protocol for Packet Speech Communications", *2007 IEEE Global Telecommunications Conference (IEEE GLOBECOM 2007)*, pp. 2952-2956, November 2007.

- [39] A. Kwasinski and K. J. R. Liu, "Characterization of Distortion-SNR Performance for Practical Joint Source-Channel Coding Systems", *2007 IEEE Global Telecommunications Conference (IEEE GLOBECOM 2007)*, pp. 3019-3023, November 2007.
- [40] K. G. Seddik, A. Kwasinski and K. J. R. Liu, "Distortion Exponents for Different Source-Channel Diversity Achieving Schemes over Multi-Hop Channels", *2007 IEEE International Conference on Communications (ICC)*, pp. 969-974, November 2007.
- [41] J. Goldstein, A. Kwasinski, P. Kingsbury, R. Evans Sabin and A. McDowell, "Annotating Subsets of the Enron Email Corpus", *Third Conference on Email and Anti-Spam, CEAS 2006*, vol. 1, pp. 39-40, July 2006.
- [42] A. Kwasinski and K. J. R. Liu, "Optimal Unequal Error Protection with User Cooperation for Transmission of Embedded Source-Coded Images", *IEEE International Conference on Image Processing, (ICIP)*, Atlanta, GA, October, 2006.
- [43] A. Kwasinski, H. V. Zhao, K. J. R. Liu, "On QoS Constraints and Joint Source-Channel Coding for Real-Time Cooperative Multimedia Communications", *Proc. of 2006 IEEE Wireless Communications and Networking Conference, (WCNC)*, vol. 1, pp. 106-111, Las Vegas, NV, April, 2006.
- [44] A. Kwasinski, Z. Han, K. J. R. Liu, "Cooperative multimedia communications: Joint source coding and collaboration", in *2005 Proceedings of IEEE Global Telecommunications Conference (GLOBECOM)*, vol. 1, pp. 374-378, Saint Louis, MO, Nov.-Dec. 2005.
- [45] A. Kwasinski, Z. Han, K. J. R. Liu, "Joint Source Coding Diversity and Cooperative Diversity for Multimedia Communications", in *Proceedings of IEEE International Workshop on Signal Processing Advances for Wireless Communications (SPAWC)*, pp. 129-133, New York, NY, June 2005.
- [46] A. Kwasinski, N. Farvardin, "Optimal Resource Allocation for CDMA Networks Based on Arbitrary Real-Time Source Coders Adaptation with Application to MPEG4 FGS", in *Proceedings of IEEE Wireless Communications and Networking Conference (WCNC)*, vol. 4, pp. 2010-2015, Atlanta, GA., March 2004.
- [47] A. Kwasinski, Z. Han, K. J. R. Liu, "Dynamic Real Time Distortion Management Over Multimedia Downlink CDMA", in *Proceedings of IEEE Wireless Communications and Networking Conference (WCNC)*, vol. 4, pp. 2214-2219, Atlanta, GA., March 2004.
- [48] G-M. Su, Z. Han, A. Kwasinski, M. Wu, K.J.R. Liu, "Distortion Management of Real-time MPEG-4 FGS Video over Downlink Multicode CDMA Networks", in *Proceedings of IEEE Intl. Conf. on Communications (ICC)*, vol. 5, pp. 3071-3075, Paris, France, June 2004.
- [49] A. Kwasinski, N. Farvardin, "Extending Operation of a CDMA Network Beyond Congestion by Cross-Layer Resource Allocation for Real-Time Traffic in Fading Channels", in *Proceedings of Allerton Conference*, pp. 1860-1869, Monticello, IL, October 2004.
- [50] A. Kwasinski, M. Alasti, N. Farvardin, K. J. R. Liu "Highly Efficient, Low Complexity Source-Assisted Multiple Access Protocol", in *Proceedings of Allerton Conference*, pp. 675- 684, Monticello, IL, October 2004.

- [51] Z. Han, A. Kwasinski, K. J. Ray Liu and N. Farvardin, "Pizza Party Algorithm for Real Time Distortion Management in Downlink Single-Cell CDMA Systems", in *Proceedings of Allerton Conference*, Monticello, IL, October 2004.
- [52] A. Kwasinski, N. Farvardin, "Resource Allocation for CDMA Networks Based on Real-Time Rate Adaptation", in *Proceedings of IEEE Intl. Conf. on Communications (ICC)*, vol. 5, pp. 3307-3311, Anchorage, AK, May 2003.
- [53] A. Kwasinski, V. Chande, N. Farvardin, "Delay-Constrained Joint Source-Channel Coding using Incremental Redundancy with Feedback", in *Proceedings of IEEE Information Theory Workshop*, pp. 283 -286, Paris, France, March-April 2003.
- [54] A. Kwasinski, Z. Han, K. J. R. Liu, N. Farvardin, "Power Minimization under Real-Time Source Distortion Constraints in Wireless Networks", in *Proceedings of IEEE Wireless Communications and Networking Conference (WCNC)*, vol. 1, pp. 532 -536 , New Orleans, LA, March 2003.

Other

- [1] A. Kwasinski, "Signals and Systems by S.K. Mitra [Book Reviews]," in *IEEE Computing in Science & Engineering Magazine*, vol. 19, no. 4, July/August 2017.
- [2] A. Kwasinski, "Foundations of Signal Processing [Book Reviews]," in *IEEE Signal Processing Magazine*, vol. 33, no. 1, pp. 163-164, Jan. 2016.
- [3] A. Kwasinski, "Extending Network Operation Beyond Congestion Through Embedded Coding [In the Spotlight]." *IEEE Signal Processing Magazine*, vol. 30, no. 1, pp. 184-182, January 2013.
- [4] D. Gunduz, A. Kwasinski, "Cooperative Multimedia Transmissions," *IEEE COMSOC MMTC E-Letter*, Vol. 6, no. 3, March 2011.
- [5] A. Kwasinski and G. Alregib, "Gadgets and Signal Processing: The 2010 International CES [In the Spotlight]," *Signal Processing Magazine, IEEE* , vol.27, no.3, pp.176-170, May 2010.
- [6] A. Kwasinski, "Multimedia Cooperative Communications," *IEEE COMSOC MMTC E-Letter*, Vol. 4, no. 11, December 2009.
- [7] A. Kwasinski, "Turbo Encoding/Decoding and Complexity/Performance Issues with Short Frames", University of Maryland, Dept. of Electrical and Computer Engineering.