Aminata A. Garba

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Education

➢ **McGill University** Ph.D. in Telecommunications (2009)
Thesis: *Non-Gaussian CDMA for Fiber-optic & Wireless*
Multi-Access Channels: Code Design and Capacity Analysis

➢ **Laval University** B.Eng. in Electrical & Computer Engineering (2002)
Project: *Digital/Analog Modulation in Communication Systems*

Professional Experience

➢ **Independent Consultant** (2013-present)

Interested in regulation and public policy, Internet and telecommunications governance, cybersecurity, public & private partnership, ICT4D, universal access, research & modelling of high data rate modulation/transmission, capacity building in wireless/fiber-optic telecommunication systems, technologies & applications.

➢ **Director General**, Autorité de Régulation Multisectorielle (ARM, Niger) (2010-2013)

Coordinate implementation of regulatory frameworks, participate in review/elaboration of strategies, policies & regulation procedures, provide analysis on several projects, services and applications in the sectors of ICT, transports, water, energy and post at the Regulatory Authority.

- Lead technical and economic regulation activities such as interconnection policy implementation & wholesale tariff consultations, price regulation, quality of service monitoring, radiofrequency spectrum & national numbering plan management, authorizations & licensing processing (3G licences, ISP authorizations), universal access funds managing;

- Contribute to the consultations, design and/or review of ICT infrastructure & application projects such as the national fiber-optic backbone, national exchange point, national internet governance forum, regional fiber-optic connection & transcontinental broadband connection;

- Organize and/or participate to capacity building events such as Regional Workshop on Space Regulation (co-organized with African Telecommunication Union & International Telecommunication Union) National Regulation Forum on ICT and Utility, National Energy Policy Forum;

- Facilitate long-term (leasing and concession) contracts negotiations between the government and (national and international) utility firms and monitor their execution by the parties;

- Participate to several ICT for development projects such as Building the National Research and Development Network, ICT and Taxation, Universal Access Project ;

- Collaborate with financial & technical partners, regional & international organizations, government & non-government organizations;

- Manage the institution, propose and execute strategic, operational actions plans for ICT and utility regulation and development, budget as well as RH capacity building plans;

- Maintain and update a data base on ICT indicators; publish the structure activities through website, bi-annual information bulletins and annual activity reports, etc.

➢ **Board Member** WATRA, CRTEL & AFWA   (2011-2013)

Acted as the **Chair** of the Executive Committee of West African Telecommunication Regulators Assembly (WATRA 2011-2012), **Vice-Chair** of the Executive Board, Telecommunication Regulators Committee (CRTEL) of the West African Monetary and Economic Union (2011-2013) & **Member of the Executive Board** of the African Water Association (AFWA 2011-2013).

- Participated on the review and approval of the technical committee proposals, regional studies and events.

- Contribute on the executive committee decisions on strategy, annual events, programs and studies. Reviewed and approved strategic/operational plans, budget, reports and programmes.

- Collaborated with National Regulatory Authorities and other stakeholders on harmonisation, capacity building and benchmarking.

➢ **Responsible**, Optimization and Quality of Network, Orange (Niger)   (2010)

Manage the Optimization & Quality of Service group and worked on the 3G network end to end project design.

➢ **Research Fellow**, National Center for Scientific Research (Paris) &
          National Institute for Scientific Research (Montreal)   (2009-2010)

Conduct research projects on design of practical hierarchical modulation for approaching capacity of broadcast channels and design of turbo codes with pilot bits that aim to improve the performance of selected coded digital communication systems, as part of the NewCom++ (Network of Excellence in Wireless Communications) Europe multipartite project on Digital Video Broadcast (DVB).

➢ **Research Assistant**, Telecommunications & Signal Processing (TSP) Laboratory   (2002-2009)

Co-supervised B.Eng. and master theses in the area of ICT & wireless communications. Carry out research in wireless and optical ICT systems. Co-authored 5 journal articles, 11 conference papers/presentations, 2 invention disclosures and 2 provisional and full US patent applications.

➢ **Teaching Assistant**, McGill University   (2003-2008)

Designed and taught graduate telecommunications courses modules on information measures & CDMA. Prepared and taught tutorials, held office hours, graded homeworks and prepared solutions for Digital Communication courses.

➢ **Circuits Designer**, IBM (International Business Machines)   (2002)

Met with clients, collected product requirements, designed printed circuit boards & wrote technical reports.

- ➤ **Teaching Assistant,** Laval University (2001)

  Review & update microelectronics laboratory assignments & instructions manual.

Awards & Fellowships

- ➤ Natural Sciences and Engineering Research Council of Canada (2006)
- ➤ Fonds Québecois de la Recherche sur la Nature et la Technologie (2006)
- ➤ McGill Major Fellowship (2006)
- ➤ Telecommunications & Signal Processing Research Grant (2002)
- ➤ Canadian International Development Agency (1998)

Community Involvement

- ➤ African Scientific Institute, Member (2012-Present)
- ➤ Internet Society (ISoc), Member (2012-Present)
- ➤ The Alliance of Youth for Endogenous Development, Mentor (2011-Present)
- ➤ Institute of Electrical and Electronic Engineering (IEEE), Member (2003-Present)
- ➤ International Institute of Telecommunications (2002-Present)
- ➤ Order of Québec Engineers, Member (2000-Present)
- ➤ Let's Talk Science, Judge for Science/Engineering Projects Competition (2004-2008)
- ➤ Canadian Workshop on Information Theory, Organisation Volunteer (2005)
- ➤ Engineer Without Borders, Volunteer (2003-2005)
- ➤ Amnesty International, Volunteer (2000-2002)

Other

- ➤ **Languages:** French, English, Haoussa, Djerma, Fulfulde
- ➤ **Computer Languages:** MS Office, MS Project, C, C++, C#, Java, Assembly, Matlab, Pspice, viewlogic, Autocad, Simulink, SAP
- ➤ **Citizenships:** Niger, Canada
- ➤ **Personal Hobbies:** Playing tennis/basketball, Reading, Listening to music, Travelling
- ➤ **References :** Available upon request

Journal Publications

[1] A. A. Garba, J. Bajcsy: "A lower bound on the capacity of the Gaussian multi-access channel with single-user decoding," *IEEE Transactions on Information Theory, (under review)*.

[2] A. A. Garba, J. Bajcsy: "Optical Code Division Multiple Access Network Transmission With *M*-ary Chip Symbols, *IEEE Journal of Optical Communications and Networking*, pp. 435 – 446, April 2011.

[3] A. A. Garba, J. Bajcsy: "A new approach to achieve high spectral efficiency in wavelength-time optical CDMA network transmission," *IEEE Photonics Technology Letters*, pp. 131 – 133, February 2007.

[4] A. A. Garba, M. Irman, J. Bajcsy: "Real-time error control coding for optical fiber telecommunication networks based on CDMA," *Photons-Technical Review of the Canadian Institute for Photonic Innovations*, pp. 21 – 23, Spring 2006.

[5] A. A. Garba, J. Bajcsy: "Spectral efficiency of power-limited OCDMA network transmission with/without optical amplifiers," *Photons-Technical Review of the Canadian Institute for Photonic Innovations*, pp. 50 – 52, Fall 2005.

[6] A. A. Garba, R. M. H. Yim, J. Bajcsy, L. R. Chen, "Analysis of optical CDMA signal transmission: Capacity and simulation results," *EURASIP J. Appl. Sig. Process. – Special Issue on Signal Analysis Tools for Optical Information Processing*, pp. 1603 – 1616, Jul. 2005.

Patent Applications

[7] Y. J. D. Kim, A. A. Garba, J. Bajcsy, "Methods and devices for communication systems using multiplied rate transmission" *US Patent Application*, April 2013.

[8] A. A. Garba, J. Bajcsy, "Method and systems for non-Gaussian code-division-multiple-access signal transmission and reception," *US Patent Application*, October 2008.

[9] Y. J. D. Kim, A. A. Garba, J. Bajcsy, "Method and apparatus for increasing data transmission rates over continuous-time communication channels," *Provisional US Patent Application*, October 2008.

[10] Y. J. D. Kim, A. A. Garba, J. Bajcsy, "Method and apparatus for increasing data transmission rates over continuous-time communication channels," *Report of Invention*, Office of Technology Transfer McGill University, October 2008.

[11] A. A. Garba, J. Bajcsy, "An apparatus for binary and non-binary code-division multiple-access at very high spectral efficiencies," *Provisional US Patent Application*, October 2007.

[12] A. A. Garba, J. Bajcsy, "An apparatus for binary and non-binary code-division multiple-access at very high spectral efficiencies," *Report of Invention*, Office of Technology Transfer, McGill University, June 2006.

Conference Publications

[13] Aminata A. Garba, J. Bajcsy: "On the Channel Capacity and Implementation Complexity of Binary CDMA with Non-Gaussian Multi-User Interference," *Canadian Summer School in Communications and Information Theory,* Banff, AB, August 2009, 2 pages.

[14] A. A. Garba, J. Bajcsy: "Asymptotic lower bound on the capacity of CDMA network transmission," *Canadian Summer School in Communications and Information Theory,* Banff, AB, 2 pages, August 2008.

[15] A. A. Garba, J. Bajcsy: "Towards spectrally efficient 2-D optical CDMA transmission with *M*-ary symbols and Poisson noise," *Proc. IEEE Global Commun. Conference,* Washington, DC, 6 pages, Nov/Dec. 2007.

[16] A. A. Garba, J. Bajcsy: "A novel spectrally efficient wireless CDMA transmission scheme system design and robustness to channel imperfections," *Proc. IEEE Military Communication Conference,* Washington, DC, 7 pages, Oct. 2006.

[17] A. A. Garba, J. Bajcsy: "A non-Gaussian coding scheme that exceeds conjectured Gaussian capacity limit in CDMA transmission with single-user decoding," *Proc. International Symposium on Information Theory and Applications,* Seoul, Korea, pp.557 – 562, Oct. 2006.

[18] A. A. Garba, J. Bajcsy, "Using turbo codes and non-Gaussian interference to improve spectral efficiency in *M*-ary optical CDMA networks," *Proc. IEEE International Symposium on Turbo Codes*, 6 pages, Munich, Germany, April 2006.

[19] A. A. Garba, N. Mysore, J. Bajcsy, "Increasing spectral efficiency in microcell hotspots using *M*-ary CDMA: Capacity analysis and simulation results," *Proc. IEEE International Conference on Broadband Networks*, Boston, MA, pp 799 – 808, Oct. 2005.

[20] A. A. Garba, J. Bajcsy, "Capacity of OCDMA network transmission with optical hard-limiters," *Proc. Canadian Workshop on Information Theory*, pp. 86 – 90, Montréal, QC, June 2005.

[21] A. A. Garba, J. Bajcsy: "Coding in optical CDMA networks with *M*-ary modulation: impact of selected physical imperfections," *Proc. IEEE Canadian Conference on Electrical & Computer Engineering.* Saskatoon, SK, pp. 1102 – 1106, May 2005.

[22] A. A. Garba, J. Bajcsy and L. R. Chen: "Increasing the capacity of optical CDMA transmission with non-binary modulation," *Proc. IASTED International Multi-Conference on Wireless and Optical Communications,* Banff, AB, pp.762 – 768, July 2004.

[23] A. A. Garba and J. Bajcsy: "Increasing the throughput of optical CDMA transmission," Recent Result Poster, *IEEE International Symposium on Information Theory*, Chicago, IL, July 2004.

Invited Presentations

[24] "Increasing Broadband Penetration in Africa", Africa Internet Summit 2013, (to be held) June 2013, Lusaka, Zambia.

[25] "Internet Governance in Niger: Definitions, Role & Stakeholders Responsibilities", 1st National Internet Governance Forum, (to be held) June 2013, Niamey, Niger.

[26] "Electronic Communications Today and Beyond", 8th International Regulators Conference, Istanbul, Turkey, May 2013.

[27] "New Technologies and Regulation Policies", ICT Summit Eurasia 2012, Istanbul, Turkey, sept. 2012.

[28] "Impact of Taxation on ICT Sector", National Roundtable on ICT and Taxation, Niamey, Niger, May 2012.

[29] "Braodband Connection, Policy and Regulation", Workshop on Building National Research and Education Niamey, Niger, November 2011.

[30] "Universal Braodband Access", ITU Global Symposium for Regulators 2011, Armenia, Columbia, 2011

[31] "Turbo Coding with Pilot Bits," presentation for the NewCom ++ Europe Project, Poznan, Poland, December 2009. (Joint work with Pierre Duhamel, Leszek Szczecinski, Sajad Sadough.)

[32] "Two new channel capacity results and their potential implications for practical communication systems," *Workshop on Modeling and Analysis of Computer and Communication System,* Princeton, NJ, May 2008. (Joint work with J. Bajcsy and Y. J. D. Kim.)

[33] "Non-Gaussian CDMA and further capacity enhancements for wireless and wireline communication systems," presentation invited by the ECSESS student society, McGill University, Montreal, QC, Nov. 2007. (Joint work with J. Bajcsy and Y. J. D. Kim.)

[34] "Some recent results on optical network transmission using CDMA," presentation at the University of Toronto, Toronto, ON, Nov. 2004. (Joint work with J. Bajcsy, R. Yim, M. Irman and L. Chen.)

[35] "Toward a fully customizable FPGA-based communication library: Enabling real-time optical CDMA," invited poster in collaboration with Xilinx corp., *IEEE International Conference on Acoustics, Speech & Signal Processing*, Montréal, QC, May 2004. (Joint work with M. Irman and J. Bajcsy.)