Yi Zhong

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EDUCATION

- **University of Science and Technology of China, Hefei, Anhui** Sep. 2010 - Jul. 2015
  Ph.D. in Electrical Engineering

  Topic: Instantaneous and Time-variant Interference Modeling and Analysis of Wireless Network
  Advisor: Professor Wenyi Zhang

- **University of Science and Technology of China, Hefei, Anhui** Sep. 2006 - Jul. 2010
  Bachelor in Electrical Engineering

  Topic: Distributed Power Control in Wireless Cellular Network
  Advisor: Professor Wuyang Zhou

RESEARCH INTERESTS

General research interests are the application of mathematical and statistical theories to communication, networking, and resource allocation problems. Specially, I focus on applying the spatial point process to model the spatial distribution as well as the mobility of users, base stations and so on. Current research topics include heterogeneous networks, green communications, WLAN, C-RAN, and ultra dense network.

HONORS AND AWARDS

- Young Elite Scientists Sponsorship Program by CAST 2020
- HUST Academic New Star Scholar Award 2020
- Dean of Chinese Academy of Sciences Award 2015
- National Scholarship (PhD) 2014
- CSC-IBM Scholarship 2014
- National Post-Graduate Mathematic Contest in Modeling (First prize) 2011
- Outstanding Student Award of USTC 2007, 2008

EXPERIENCE

Work Experience

- **Huazhong University of Science and Technology, China**
  Associate Professor, Nov. 2021-Now

  School of Electronic Information and Communications

- **University of Technology Sydney, Sydney**
  Visiting Fellow, Jul. 2019-Aug. 2019

  Engineering and Information Technology, Prof. Guoqiang Mao's Research Group

- **Huazhong University of Science and Technology, China**
  Assistant Professor, Jan. 2017-Oct. 2021

  School of Electronic Information and Communications

- **Singapore University of Technology and Design, Singapore**
  Postdoctoral Research Fellow, Jul. 2015-Dec. 2016

  Information Systems Technology and Design Pillar, Prof. Tony Q.S. Quek's Research Group

- **Qualcomm Incorporated, China**
  Research Intern, Jul. 2013-Oct. 2013

  Corporate Research and Development

- **University of Notre Dame, USA**
  Research Visitor, Aug. 2012-Dec. 2012

  Prof. Martin Haenggi's Research Group

- **Institute of Computing Technology Chinese Academy of Sciences, China**
  Research Intern, Jul. 2009-Sep. 2009

  College Student Research Program

Teaching Experience

- **Huazhong University of Science and Technology**
  School of EIC, Feb. 2018-Present

  - 0844721: Fundamentals of Wireless Communications

  - 0800714: Electronic Circuitry Design, Test and Experiments (I)

  - 0800715: Electronic Circuitry Design, Test and Experiments (II)

- **University of Science and Technology of China**
  Dept. of EEIS, Teaching Assistant (TA), Sep. 2011-Dec. 2011

  - CS01002: C Programming Language

RESEARCH HIGHLIGHTS

- Heterogeneous and femtocell-overlaid cellular networks, wireless ad hoc networks, CSMA and RTS/CTS mechanism in 802.11, energy-efficient network, stochastic geometry, point process theory. Specific contributions include:

  - **Delay, cost and area spectrum efficiency tradeoff in C-RAN:** Proposed the complementary networking, in which the network architecture is a hybrid of the C-RAN and the traditional BSs, to combine the advantages of both kinds of networks.

  - **Stability of interacting queues in random network:** Combined the queue theory and the Poisson point process framework to analyze the random network. Obtained the sufficient condition and necessary condition for stability of the overall random network.

  - **Interference correlation and delay in ad hoc network:** Explored the difference between frequency-splitting and ALOHA in reducing interference correlation by introducing local delay as metric.

  - **Interference for CSMA protocol with RTS/CTS mechanism:** Proposed a novel hard-core point process to model the spatial distribution of the interferers for CSMA protocol with RTS/CTS mechanism. Derived the accurate expressions for mean interference.

  - **Separation architecture in energy-efficient cellular network:** Evaluated the energy saving by introducing separation architecture (separation of coverage BS and traffic BS) in energy-efficient cellular network.

  - **Resource allocation for hybrid access femtocell:** Modeled the hybrid access mechanism in heterogeneous cellular networks with either randomly distributed or clustered femtocells. Evaluated the tradeoff of sub-channels allocation between subscribers and nonsubscribers.

- **Interference Management for eIMTA in TD-LTE:** Evaluated the interference and capacity for dynamic TDD through system level simulation and proposed a distributed algorithm based on BS-BS interference measurement to mitigate the interference.

PROFESSIONAL ACTIVITIES

Associate Editor

1. IEEE WIRELESS COMMUNICATION LETTERS, Jan. 2020-Present.

2. EURASIP JOURNAL ON WIRELESS COMMUNICATIONS AND NETWORKING, June 2019-Present.

3. ELSEVIER PHYSICAL COMMUNICATION, Aug. 2019-Present.

Workshop Chair

1. Workshop On Advances in the Future Network Modeling, Analysis, and Optimization, China, July 21, 2019.

Affiliations

- **Member:** IEEE Member, IEEE Communications Society Member, IEEE Information Theory Society Member

- **TPC Member:** ICC 2019/2018, WiOpt 2018, SpaSWiN'18, PIMRC 2018, WCNC 2019/2018/2017, WC-SP 2014, ICCC 2016/2015, EuCNC 2016/2015, ISTA 2016

- **Reviewer:** IEEE JSAC, IEEE T-WC, IEEE T-COM, IEEE T-VT, China Communications, EURASIP JWC-N, and major international conferences on communications, control, information theory, networking, and signal processing.

PUBLICATIONS, PATENTS, & PRESENTATIONS

Book Chapters

1. Howard H. Yang, Y. Zhong, and T. Q. S. Quek, "Ultra Dense Networks with Spatio-Temporal Traffic," in *Ultra Dense Networks: Principles and Technologies*, Cambridge University Press, 2019.

2. Y. Zhong, Howard H. Yang, and Jianhua Tang, "Delay and Traffic Matching in Ultra Dense Networks," in *Ultra Dense Networks: Principles and Technologies*, Cambridge University Press, 2019.

Journal Papers (Published/Accepted)

1. Y. Jiang, Y. Zhong and X. Ge, "IIoT Data Sharing Based on Blockchain: A Multileader Multifollower Stackelberg Game Approach," in *IEEE Internet of Things Journal*, vol. 9, no. 6, pp. 4396-4410, Mar., 2022

2. X. Ge, H. Liu and Y. Zhong, "Massive Wireless Access Enhancement Based on Self-Similarity of Fractal Channels in Multi-Scale Space," in *IEEE Internet of Things Journal*, accepted to appear, 2022.

3. L. Yang, F. -C. Zheng, Y. Zhong, S. Jin and A. G. Burr, "On the SIR Meta Distribution for Cache-Enabled Wireless Networks with Random Discontinuous Transmission: Analysis and Optimization," in *IEEE Transactions on Wireless Communications*, accepted to appear, 2022.

4. L. Yang, F. -C. Zheng, Y. Zhong and S. Jin, "Spatio-Temporal Analysis of Meta Distribution for Cell-Center/Cell-Edge Users," *IEEE Transactions on Communications*, vol. 69, no. 12, pp. 8256-8270, Dec. 2021.

5. Y. Zhong, G. Mao, X. Ge, and F. Zheng, "Spatio-temporal Modeling for Massive and Sporadic Access," *IEEE Journal on Selected Areas in Communications*, vol. 39, no. 3, pp. 638-651, Mar. 2021.

6. D. Feng, L. Lai, J. Luo, Y. Zhong, C. Zheng, and Y. Kai. "Ultra-reliable and low-latency communications: applications, opportunities and challenges," in *SCIENCE CHINA Information Sciences*, vol 62, pp. 120301, no. 2, Feb. 2021.

7. G. Wang, Y. Zhong, R. Li, T. Han, X. Ge, and T. Q.S. Quek "Effect of Spatial and Temporal Traffic Statistics on the Performance of Wireless Networks," in *IEEE Transactions on Communications*, vol. 68, no. 11, pp. 7083-7097, Nov. 2020.

8. Y. Lai, Y. Zhong, and J. Wang, "High Real-Time Capacity Prediction Based on Neural Network Evaluation," in *ZTE Technology Journal*, vol. 26, pp. 13-22, no. 4, Aug. 2020.

9. Y. Jiang, Y. Zhong and X. Ge, "Smart Contract-Based Data Commodity Transactions for Industrial Internet of Things," in IEEE Access, vol. 7, pp. 180856-180866, Dec. 2019.

10. Y. Jiang, X. Ge, Y. Zhong, G. Mao and Y. Li, "A New Small-World IoT Routing Mechanism based on Cayley Graphs," in IEEE Internet of Things Journal, vol. 6, no. 6, pp. 10384-10395, Dec. 2019

11. T. Han, S. Li, Y. Zhong, Z. Bai and K. S. Kwak, "5G Software-Defined Heterogeneous Networks with Cooperation and Partial Connectivity," in IEEE Access, vol. 7, pp. 72577-72590, June 2019.

12. Rongpeng Li, Zhifeng Zhao, Yi Zhong, Chen Qi, and Honggang Zhang, "The Stochastic Geometry Analyses of Cellular Networks With α-Stable Self-Similarity," *IEEE Transactions on Communications*, vol. 67, no. 3, pp. 2487-2503, March 2019.

13. Y. Zhong, G. Wang, T. Han, M. Wu and X. Ge "QoE and Cost for Wireless Networks with Mobility under Spatio-Temporal Traffic," *IEEE Access*, vol. 7, pp. 47206-47220, March 2019.

14. X. Ge, H. Jia, Y. Zhong, Y. Xiao, Y. Li, and B. Vucetic "Energy Efficiency Optimization of 5G Full Duplex Cellular Networks: A Mean Field Game Approach" *IEEE Transactions on Green Communications and Networking*, vol. 3, no. 2, pp. 455-467, June 2019.

15. J. Yang, X. Ge, and Y. Zhong, "How Much of Wireless Rate Can Smartphones Support in 5G Networks?" *IEEE Network*, vol. 33, no. 3, pp. 122-129, May/June 2019.

16. Y. Zhong, X. Ge, H. H. Yang, T. Han, and Q. Li, "Traffic Matching in 5G Ultra-dense Networks," *IEEE Communications Magazine*, vol. 56, no. 8, pp. 100-105, Aug. 2018.

17. Y. Zhong, X. Ge, T. Han, Q. Li, and J. Zhang, "Tradeoff between Delay and Physical Layer Security in Wireless Networks," *IEEE Journal on Selected Areas in Communications*, vol. 36, no. 7, pp. 1635-1647, July 2018.

18. J. Chen, X. Ge, X. Song, Y. Zhong, "Base Station Switch-off with Mutual Repulsion in 5G Massive MIMO Networks," *IET Communications*, , vol. 12, no. 16, pp. 2038-2045, Sept. 2018.

19. J. Ye, X. Ge, G. Mao, and Y. Zhong, "5G ultradense networks with nonuniform distributed users," *IEEE Transactions on Vehicular Technology*, vol. 67, no. 3, Mar. 2018.

20. Y. Zhong, M. Haenggi, F. Zheng, W. Zhang, T. Q.S. Quek, and W. Nie, "Toward a Tractable Delay Analysis in Ultra-dense Networks," *IEEE Communications Magazine*, vol. 55, no. 12, pp. 103-109, Dec. 2017.

21. H. Yang, G. Geraci, Y. Zhong, and T. Q.S. Quek, "Packet Throughput Analysis of Static and Dynamic TDD in Small Cell Networks," *IEEE Wireless Communications Letters*, vol. 6, no. 6, pp. 742-745, Dec. 2017.

22. Y. Zhong, T. Q.S. Quek, and W. Zhang, "Complementary Networking for C-RAN: Spectrum Efficiency, Delay and System Cost," *IEEE Transactions on Wireless Communications*, vol. 16, no. 7, pp. 4639-4653, July 2017.

23. Y. Zhong, T. Q.S. Quek, and X. Ge, "Heterogeneous Cellular Networks with Spatio-Temporal Traffic: Delay Analysis and Scheduling," *IEEE Journal on Selected Areas in Communications*, vol. 35, no. 6, pp. 1373-1386, June 2017. (ESI Top 1% Highly cited Paper)

24. L. Wu, Y. Zhong, W. Zhang, and M. Haenggi, "Scalable Transmission over Heterogeneous Networks: A Stochastic Geometry Approach," *IEEE Transactions on Vehicular Technology*, vol. 66, no. 2, pp. 1845-1859, Feb. 2017.

25. Y. Zhong, F. Zheng, and W. Zhang, "Dynamic scheduling and optimization of resources in hyper-cellular network," SCIENTIA SINICA Informationis, vol. 47, no. 5, pp. 576-590, 2017.

26. Y. Zhong, P. Qiao, W. Zhang, and F. Zheng, "No Blind Spot: Network Coverage Enhancement Through Joint Cooperation and Frequency Reuse," *J. of Communications and Networks*, vol. 18, no. 5, pp. 773-783, Oct. 2016.

27. Y. Zhong, M. Haenggi, T. Q. Quek and W. Zhang "On the Stability of Static Poisson Networks under Random Access". *IEEE Transactions on Communications*, vol. 64, no. 7, pp. 2985-2998, July 2016.

28. A. Guo, Y. Zhong, W. Zhang, and M. Haenggi, "The Gauss-Poisson Process for Wireless Networks and the Benefits of Cooperation," *IEEE Transactions on Communications*, vol. 64, no. 5, pp. 1916-1929, May 2016.

29. W. Nie, Y. Zhong, F. Zheng, W. Zhang, and T. O'Farrell, "HetNets with Random DTX Scheme: Local Delay and Energy Efficiency," *IEEE Transactions on Vehicular Technology*, vol. 65, no. 8, pp. 6601-6613, Aug. 2016.

30. L. Liu, Y. Zhong, W. Zhang, and M. Haenggi, "On the Impact of Coordination on Local Delay and Energy Efficiency in Poisson Networks," *IEEE Wireless Communications Letters*, vol.4, no.3, pp.241-244, June 2015.

31. Y. Zhong, W. Zhang, and M. Haenggi, "Managing interference correlation through random medium access," *IEEE Transactions on Wireless Communications*, Vol. 13, No. 2, pp. 928-941, Feb. 2014.

32. Y. Zhong and W. Zhang, "Multi-channel hybrid access femtocells: a stochastic geometric analysis," *IEEE Transactions on Communications*, Vol. 61, No. 7, pp. 3016-3026, July 2013.

Refereed Conference Proceedings

1. L. Zou, Y. Zhong, F. Gong and T. Han, Interference Correlation Caused by Spatio-Temporal Correlation of Traffic, in *Proc. IEEE Global Communications Conference (Globecom)*, accepted, 2022.

2. D. Jia, Y. Zhong, R.C. Qiu, X. Ge, "Performance of Multiple Intelligent Reflecting Surfaces Assisted Communication," in International Conference on Wireless Communications and Signal Processing (WCSP), accepted to appear, 2022.

3. P. Hu, Y. Zhong and Y. Lai, "Capacity Prediction for Wireless Networks Based on Convolutional Neural Network," in International Conference on Information and Communication Technologies for Disaster Management (ICT-DM), Hangzhou, China, Dec. 2021.

4. X. Liang, Y. Zhong and L. Zou, "Real-Time Sensing and Communication Improvement with Mobile Sensors," IEEE/CIC International Conference on Communications in China (ICCC Workshops), Xiamen, China, July, 2021.

5. X. Wang, Y. Zhong, X. Ge, X. Hei, Y. Gao and Z. Xu, "Capstone Projects Design Based on 5G Experimental Platform Deployed on Campus," IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE), pp. 835-840, Takamatsu, Japan, Dec. 2020.

6. L. Yang, F. Zheng, Y. Zhong and S. Jin, "Analysis and Optimization of Local Delay for Cache-Enabled Networks with Random DTX," in Proc. IEEE International Conference on Communications (ICC), Montreal, Canada, June 2021.

7. Z. Chen, Y. Zhong, X. Ge and Y. Ma, "An Actor-Critic-Based UAV-BSs Deployment Method for Dynamic Environments," in Proc. IEEE International Conference on Communications (ICC), Dublin, Ireland, June 2020.

8. Meifang Wu, Yi Zhong, Gang Wang, Changyang She, Xiaohu Ge, Han-Chieh Chao "URLLC in Large-Scale Wireless Networks With Time and Frequency Diversities," in *Proc. IEEE Global Communications Conference (Globecom)*, Waikoloa, HI, USA, Dec. 2019.

9. J. Chen, X. Ge, Y. Zhong and Y. Li, "A Novel JT-CoMP Scheme in 5G Fractal Small Cell Networks," IEEE Wireless Communications and Networking Conference (WCNC), Marrakesh, Morocco, 2019.

10. Jing Yang, Yi Zhong, Xiaohu Ge, Han-Chieh Chao "Power-Consumption Outage Challenge in Next-Generation Cellular Networks," in *Proc. IEEE Global Communications Conference (Globecom)*, Waikoloa, HI, USA, Dec. 2019.

11. G. Wang, Y. Zhong, T. Han, X. Ge, T. Q.S. Quek, "On the Effect of Spatio-temporal Fluctuation of Traffic in Wireless Networks," in *Proc. IEEE Global Communications Conference (Globecom)*, Abu Dhabi, UAE, Dec. 2018.

12. G. Wang, Y. Zhong, M. Wu, T. Han, "Spatio-temporal Traffic with Mobility in Poisson Networks," in *Proc. IEEE Global Communications Conference (Globecom) Workshop*, Abu Dhabi, UAE, Dec. 2018.

13. Y. Hu, Y. Zhong, W. Zhang, "Analysis of Age of Information in Poisson Networks," in *Proc. 2018 10th International Conference on Wireless Communications and Signal Processing (WCSP)*, Hangzhou, Zhejiang, Oct. 2018.

14. Y. Zhong, T. Han, Q. Li, and X. Ge, "Delay and Physical Layer Security Tradeoff in Large Wireless Networks," in Proc. IEEE International Conference on Communications (ICC), Kansas City, MO, USA, May 2018.

15. T. Boonphoka, N. Pappasy, Y. Zhong, X. Ge, P. Uthansakulz, T. Q.S. Quek, D. Yuan, "Performance Analysis of Full-Duplex Relay Channel with Random Access" in *Proc. IEEE Globecom Workshop*, Singapore, Dec. 2017.

16. L. Liu, Y. Zhong, H. Yang, M. Sheng, T. Q.S. Quek, and J. Li, Mean Packet Throughput Analysis of Downlink Cellular Networks with Spatio-Temporal Traffic," in *Proc. IEEE Globecom*, Singapore, Dec. 2017.

17. Y. Zhong, W. Zhang, and M. Haenggi, "Stability Analysis of Static Poisson Networks," to appear in *Proc. IEEE International Symposium on Information Theory (ISIT)* 2015

18. Y. Zhong and W. Zhang, "Downlink Analysis of Multi-channel Hybrid Access Two-tier Networks," in *Proc. IEEE International Conference on Communications (ICC)*, Ottawa, ON, Canada, June 2012

19. Y. Zhong, W. Zhang, and M. Haenggi, "Stochastic analysis of the mean interference for the RTS/CTS mechanism," in *Proc. IEEE International Conference on Communications (ICC)*, Sydney, Australia, June 2014

20. Y. Zhong, P. Cheng, N. Wang and W. Zhang, "Dynamic TDD Enhancement through Distributed Interference Coordination," to appear in *Proc. IEEE International Conference on Communications (ICC)*, London, UK, June 2015

21. Y. Zhong, W. Zhang, and M. Haenggi, "Delay Analysis in Static Poisson Network," *IEEE International Conference on Communications of China (ICCC)*, Shenzhen, China, November 2015

22. Z. Zhang, L. Wang, Z. Bai, K.S. Kwak, Y. Zhong, X. Ge, and T. Han, "The Analysis of Coverage and Capacity in mmWave VANET," to appear in *Proc. International Conference on Communication Software and Networks (ICCSN)*, Chengdu, China, July 2018.

23. C. Feng, Y. Zhong, T. Quek, G. Wu, "Power Control in FullDuplex Networks: Area Spectrum Efficiency and Energy Efficency," *IEEE International Conference on Communications*, Paris, 2017.

24. A. Guo, Y. Zhong, M. Haenggi, and W. Zhang, "Success probabilities in Gauss-Poisson networks with and without cooperation," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Honolulu, HI, USA, June-July 2014

25. L. Wu, Y. Zhong, W. Zhang, and M. Haenggi, "Scalable transmission over heterogeneous networks," in *Proc. 13th International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks (WiOpt)*, Mumbai, India, May 2015

26. P. Qiao, Y. Zhong, and W. Zhang, "Base station cooperation for energy efficiency: a Gauss-Poisson process approach," (invited paper) in *Proc. APSIPA Annual Summit and Conference (ASC)*, Kaohsiung, Taiwan, October-November 2013

27. H. Sun, Y. Zhong, and W. Zhang, "Subchannel Selection Through A Recommender System," (invited paper) in *Proc. the 2010 International Conference on Wireless Communications and Signal Processing (WCSP)*, Suzhou, China, October 2010

28. L. Wu, Y. Zhong, and W. Zhang, "Spatial statistical modeling for heterogeneous cellular networks - an empirical study," in *Proc. IEEE Vehicular Technology Conference (VTC2014-Spring)*, Seoul, Korea, May 2014

29. A. Guo, Y. Zhong, H. Yin and W. Wang, "Analysis of Energy Harvesting Wireless Networks: Coverage, Local Delay and Energy Efficiency," in *Proc. the 2015 International Conference on Wireless Communications and Signal Processing (WCSP)*, Nanjing, China, October 2015

30. W. Nie, Y. Zhong, F. Zheng and W. Zhang, "Local Delay and Energy Efficiency Analysis in HetNets with Random DTX Scheme," in *Proc. IEEE International Conference on Communications (ICC)*, London, UK, June 2015

Patents

1. T. Han, S. Xiong, Y. Zhong, X. Ge, H. Jiang and X. Liu, "A rate estimation method for heterogeneous millimeter wave cellular networks", Chinese patent application (SIPO Number 2017105805918).

2. L. Wu, Y. Zhong and W. Zhang, "Method and system for scalable coded video transmission in heterogeneous cellular networks", Chinese patent application (SIPO Number 201510102457.8).

Thesis

1. Yi Zhong, "*Instantaneous and Time-variant Interference Modeling and Analysis of Wireless Network,*" Doctoral dissertation, Department of Electrical Engineering and Information Science, University of Science and Technology of China, Hefei, Anhui, Jun. 2015.
   Thesis advisor: Professor Wenyi Zhang.

2. Yi Zhong, "*Distributed Power Control in Wireless Cellular Network,*" Bachelor's thesis, Department of Electrical Engineering and Information Science, University of Science and Technology of China, Hefei, Anhui, Jun. 2010, Thesis advisor: Professor Wuyang Zhou.

Tutorial

1. "Networks and Devices Revolution for 5G: Fundamentals and Recent Advances", IEEE International Conference on Communications in China (ICCC), 2016, Chengdu, China.