# Résumé

## Dr. Khaled B. Letaief, *FIEEE, FHKAES, FHKIE*

Member, *United States National Academy of Engineerting*
President Emeritus, *IEEE Communications Society*
*New Bright Professor of Engineering*
*Chair Professor of Electronic and Computer Engineering*

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## Highlights of Major Achievements and Experience

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|---|---|
| *Publications (Referred Journals & Conferences)* | 702   *Total*<br>     328 Journals, 374 Conference papers |
| *No. Citations (as of 3 May, 2022)* | 41,417 citations |
| *h-index* (as of 3 May, 2022) | 90 |
| *i10-index* (as of 3 May, 2022) | 408 |
| *ISI Highly Cited Researcher (2011)* | Among the top 250 preeminent individual researchers in the field of Computer Science and Engineering.  ISI Highly Cited Researchers are individuals that are the most highly cited and comprise less than one-half of one percent of all publishing authors. |
| *National Academies* | • *Member,* United States National Academy of Engineering (NAE)<br>• *Member,* Hong Kong Academy of Engineering Sciences (HKAES) |
| *University Administration Experience and Leadership* | • *Provost,* HBKU (HBKU is a research-intensive university working in partnerships with leading universities such as Northwestern, Carnegie Mellon, Cornell, and Texas A&M)<br>• *Dean*, School of Engineering, HKUST (School ranked # 14 in the world in 2015 according to QS World University Rankings)<br>• *Head*, Electronic and Computer Engineering Department, HKUST (one of the largest departments at HKUST with 55 faculty under my tenure) |
| *Research Institute/Center Administration Experience* | • *Director*, Hong Kong Telecom Institute of Information Technology<br>• *Founding Director*, Huawei Innovation Laboratory<br>• *Director*, Wireless IC System Design Center<br>• *Director*, Center for Wireless Information Technology |
| *Professional Society Leadership* | • *President*, IEEE Communications Society<br>• *Division Director and Member*, IEEE Board of Directors<br>• *Vice-President Technical Activities*, IEEE Communications Society<br>• *Vice-President Conferences*, IEEE Communications Society<br>• *Member*, IEEE Publication Services and Products Board<br>• *Member*, IEEE Communications Society Board of Governors |
| *Editorial Boards Leadership* | • Editor-in-Chief, *IEEE Transactions on Wireless Communications*<br>• Editor-in-Chief, *IEEE Journal Selected A. Communications-Wireless Series*<br>• Editor, *IEEE Transactions on Communications*<br>• Editor, *Proceedings of IEEE* |
| *Graduate Students* | Total 77: 35 MPhil, 3 MSc, 39 PhD (33 completed and 6 in progress) |
| *Grants/Research Projects* | Over 65 with a significant amount of funding and large-scale projects |
| *Keynotes and Plenary Talks* | 45 |
| *Fellowship in Professional Societies* | IEEE, HKIE, and HKAES |
| *Awards and Recognition* | 10   (including *IEEE Marconi Prize Award in Wireless Communications)* |
| *IEEE Best Paper Awards* | 19 |
| *Research Awards* | Distinguished Research Excellence Award, HKUST (One award / 3 years) |
| *Teaching Awards* | 6   (including the top HKUST *university-wide Award*) |
| *Industry Standard Contributions* | 6 contributions to IEEE Standards (IEEE 802.22) |
| *Patents* | 15   (including 11 US patents) |
| *Worldwide Standing* | Ranked among the top 4 in the world[1].  Also listed among the 2020 *AI 2000 Internet of Things Most Influential Scholars (top 30 worldwide)* |

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[1] *According to Google citations in the field of wireless (as of 3 May, 2022).*

## EDUCATION

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|---|---|
| 1990 | *Ph.D. in Electrical Engineering,* Purdue University, W-Lafayette, Indiana, USA |
| 1986 | *M.S. in Electrical Engineering*, Purdue University, W-Lafayette, Indiana, USA |
| 1984 | *B.S. in Electrical Engineering <u>with Distinction</u>,* Purdue University, W-Lafayette, Indiana, USA |

## ACADEMIC APPOINTMENTS

| | |
|---|---|
| 2019- | *New Bright Professor of Engineering,* HKUST, Hong Kong |
| 2005- | *Chair Professor of Electronic and Computer Engineering*, HKUST, Hong Kong |
| 2001-2005 | *Professor,* ECE Department, HKUST, Hong Kong |
| 1996-2000 | *Associate Professor,* ECE Department, HKUST, Hong Kong |
| 1993-1996 | *Assistant Professor,* ECE Department, HKUST, Hong Kong |
| 1990-1993 | *Lecturer/Assistant Professor,* EEE Department, University of Melbourne, Australia |
| 1985-1990 | *Graduate Instructor & Research Assistant,* School of Electrical Engineering, Purdue University, USA |

## RESEARCH INTEREST

- Wireless communications and networks
- Big data analytics systems
- Artificial intelligence
- Cloud and mobile edge computing
- Tactile Internet
- 5G systems and Beyond

## UNIVERSITY ADMINISTRATION EXPERIENCE AND LEADERSHIP

**2015-2018**    **PROVOST, HAMAD BIN KHALIFA UNIVERSITY**

Joined Hamad bin Khalifa University (HBKU) to help establish a research-intensive university in Qatar that is building its foundation upon unique collaborations with the best local and international institutions that include Northwestern, Carnegie Mellon, Cornell, and Texas A&M.

As the chief academic officer of the University, I led the University academic strategic planning, budget allocation, and management for all academic units and support functions. These include student affairs, faculty research facilities, student recruitment and admission, library, academic records and registration; faculty affairs (including recruiting and promotion); and compliance with national, international, and professional accreditation standards.

I also led the University in hiring a talented pool of faculty and senior administrators, attracting outstanding students, as well as, successfully launching 10 research-integrated and interdisciplinary academic programs.

**2009-2015**    **DEAN, SCHOOL OF ENGINEERING, HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY**

Assumed full responsibility for all substantive academic and administrative matters of the School, including formulating the Engineering School development plans and annual work plans, and ensuring their implementation; producing annual budgets and accounts for the School; taking charge of the administration and management of the School's human resources and operations, establishing and consolidating the School's management and organizational units, and building up the academic and management culture of the School. I was also responsible for external publicity for the School, maintaining relations and linkages with alumni and all relevant parties including governments, institutions and industries.

Under my leadership, HKUST Engineering has not only produced outstanding scholarship and actively pursued knowledge transfer, it has also transformed its education and positions itself as a center of excellence for engineering education and innovation. Its international standing also reached new heights with the school ranked # 14 worldwide according to QS World University Rankings.

2003-2009     **HEAD, ELECTRONIC & COMPUTER ENGINEERING DEPARTMENT, HKUST**
Responsible for all academic and administrative matters of the Department, including formulating the development plans and annual operating plans, and ensuring their implementation; producing annual budgets and accounts for the Department; and taking charge of the administration and management of the Department's human resources and operations.

During my term as Head, we have been extremely successful in attracting outstanding faculty as well as in transforming the Department's research and education programs.

## RESEARCH INSTITUTE/CENTER LEADERSHIP AND MANAGEMENT

2008-2009     **FOUNDING DIRECTOR, HUAWEI INNOVATION LABORATORY, HKUST**
This is a laboratory funded by Huawei, a leader in providing advanced telecommunications networks. It is the first Huawei R&D lab in Hong Kong whose aims are to 1) Support HKUST's pursuit in academic excellence in wireless communications; and 2) Enhance Tech transfer, innovation, and industrial collaboration.

2006-2009     **DIRECTOR, WIRELESS IC SYSTEM DESIGN CENTER, NANSHA, CHINA**
This is a research center we established in Nansha's HKUST campus to promote research and development in wireless communications and Integrated Circuit design for wireless systems.

2002-2015     **DIRECTOR, HONG KONG TELECOM INSTITUTE OF INFORMATION TECHNOLOGY, HKUST**
HKTIIT is a research institute founded based upon a generous donation from the PCCW Foundation ($100 Million Dollars). Its mission is to 1) Contribute to a dramatic advancement in the way people of Hong Kong and the region work, learn, and communicate through research and development in a broad spectrum of information technologies; and 2) Formulate, sponsor, and execute research and development programs in information technology.

2001-2007
2014-     **DIRECTOR, CENTER FOR WIRELESS INFORMATION TECHNOLOGY, HKUST**
This is a research center who has attracted major funding from mobile service providers and wireless infrastructure companies. Its mission is to 1) Perform high caliber research and development; 2) Offer excellent training and education for undergraduate and graduate students; and 3) Provide technology transfer and consultant services for industry and government.

## MAJOR PROFESSIONAL SOCIETY LEADERSHIP

2022-2023     **DIVISION III DIRECTOR** and **MEMBER**, IEEE Board of Directors
The IEEE Board of Directors is the governing body of the IEEE.

2020-2021     **MEMBER**, IEEE Periodicals Committee
Overseas all IEEE publications including the review and launch of new journals and magazines.

2018-2019     **PRESIDENT**, IEEE Communications Society
Elected by the voting members in 162 countries and is the Chief Executive Officer of the Society.

2018-2019     **MEMBER**, IEEE Technical Activities Board
This is the largest of six major IEEE-wide boards within IEEE. It is the governing body of IEEE Technical Activities and is responsible for overseeing and the management and operation of all the IEEE Societies and Technical Councils while supporting the technical communities in developing and delivering timely intellectual property products and conferences on current or emerging technologies.

2016-2017     **DIRECTOR OF JOURNALS**, IEEE Communications Society
Chairs the Journals Board, whose members are the Editor-in-Chiefs. The Board manages the Society's journals, both wholly-owned and those co-sponsored with other IEEE and non-IEEE societies, to ensure sustained quality and proper focus on ComSoc's technical scope.

2014-2015     **VICE-PRESIDENT FOR TECHNICAL ACTIVITIES**, IEEE Communications Society
Provides leadership for all technical activities. Also works with Directors and volunteer leaders to ensure bourgeoning of the Society current technical fields and activities for high-quality innovative and timely knowledge, as well as develop, interdisciplinary and new technical areas.

2013-2015     **MEMBER**, IEEE Fellow Evaluation Committee

2012-2014     **ELECTED MEMBER**, IEEE Publication Services and Products Board

This is one of the major IEEE-wide boards. It is responsible for formulating information-related, published services and products policies, establishing and maintaining standards and procedures for IEEE information dissemination, and recommending policies and best practices.

2012-2013   **TREASURER**, IEEE Communications Society
Responsible for maintaining accurate and timely financial records of the Society. Also provides leadership and a general supervision of the fiscal affairs of the Society and budget.

2011-2013   **IEEE DISTINGUISHED LECTURER**, IEEE Communications Society

2010-2011   **VICE-PRESIDENT FOR CONFERENCES**, IEEE Communications Society
Manages a portfolio of over 80 conferences. Also works with Directors and volunteer leaders to ensure profitability, growth, quality, and the delivery of value to members.

2003-2004   **CHAIR**, IEEE Technical Committee on Wireless Communications

## MAJOR EDITORIAL SERVICE

2020-       **SENIOR EDITOR,** *IEEE Journal on Selected Areas in Communications*- *Machine Learning in Communications and Networks Series*

2020-2022   **EDITOR**, *Proceedings of IEEE*

2013-2015   **EDITOR**, *IEEE Access*

2007-2010   **EDITOR AT-LARGE**, *IEEE Transactions on Wireless Communications*

2002-2006   **FOUNDING EDITOR-IN-CHIEF**, *IEEE Transactions on Wireless Communications*
This is currently one of the largest IEEE journals. The editor-in-Chief is in charge of leading, formulating policies, and managing the journal and its editorial board of about 100 editors

2001-2002   **EDITOR-IN-CHIEF**, *IEEE Journal Selected Areas in Communications – Wireless Series*
The IEEE Journal on Selected Areas in Communications is consistently ranked among the top telecommunications and electrical and electronics engineering journals according to impact factor

1997-2002   **EDITOR**, *IEEE Transactions on Communications*

1997-2005   **TECHNICAL EDITOR**, *IEEE Communications Magazine*

1996-2015   **EDITOR**, *Wireless Personal Communications*

1997        **GUEST EDITOR**, *IEEE Journal on Selected Areas in Communications*

## MAJOR CONFERENCE ORGANIZATION

| | |
|---|---|
| 2024 | General Vice-Chair, IEEE Global Communications Conference (GLOBECOM), Cape Town, South Africa |
| 2023 | General-Chair, IEEE Global Communications Conference (GLOBECOM), Kuala Lumpur, Malaysia |
| 2021 | General Co-Chair, IEEE International Mediterranean Conference on Communications and Networking (MeditCom), Athens, Greece |
| 2018 | Executive Vice-Chair, IEEE Global Communications Conference (GLOBECOM), Abu Dhabi, UAE |
| 2013 | General-Chair, IEEE International Wireless Communications and Mobile Computing Conference, Italy |
| 2012 | General Chair, IEEE International Conference on Communications in China, Beijing, China |
| 2011 | General Co-Chair, IEEE Technology Time Machine, Hong Kong |
| 2010 | Vice General-Chair, IEEE International Conference on Communications (ICC), Cape Town, South Africa |
| 2008 | Technical Program Co-Chair, IEEE International conference on Communications (ICC), Beijing, China |
| 2007 | General Co-Chair, IEEE Wireless Communications and Networking Conference, Hong Kong |
| 2006 | General Co-Chair, International Conference on Communications and Networking in China, Beijing, China |
| 2005 | Vice-Chair Technical Program Committee, International Conference on Wireless and Mobile Computing, Networking and Communications, Montréal, Canada |
| 2004 | Co-Chair, 2004 IEEE Wireless Communications, Networks and Systems Symposium, Dallas, USA |
| 2001 | General Co-Chair, IEEE ICC'01 Communications Theory Symposium, Helsinki, Finland |
| 1998 | Technical Program Chair, IEEE Mini-Conference on Communications Theory, Sydney, Australia |

## MAJOR GOVERNMENT BODIES/ADVISORY BOARDS

| | |
|---|---|
| 2019- | Member, ASTRI – University Advisory Council, Hong Kong |
| 2019- | Member, School of Physical Science and Technology Advisory Board, ShanghaiTech University, China |
| 2017- | Member, Advisory Board of the School of Science and Engineering at Lahore University of Management Sciences, Pakistan |
| 2016- | Member, King Fahd University of Petroleum & Minerals College of Engineering Sciences and Applied Engineering Advisory Board |
| 2014-2015 | Member, Canada Foundation for Innovation Multi-disciplinary Assessment (MAC) Committee, Canada |
| 2013-2016 | Member, Advisory Board Member of the Engineering Systems and Design, Singapore University of Technology and Design, Singapore |
| 2013- 2015 | Member, International Advisory Committee Member, Electrical and Electronic Engineering, The University of Melbourne, Australia |
| 2012- | Member, International Advisory Committee Member, School of Information Science and Technology, Fudan University, China |
| 2011-2016 | External Expert Committee Member, Ministry of Education, Singapore |
| 2005-2015 | Chair, Communications Technologies Domain Advisory Committee of ASTRI, Hong Kong |
| 2008- | Member, Technical Advisory Board for the Korean Information Technology Research Center for Cooperative Wireless Communications, Korea |
| 2007 | Member, King Abdullah University of Science and Technology Scholarships Selection Panel |
| 2007-2010 | External Expert Committee Member, PROMPT-Québec, Canada |
| 2004-2009 | Member, International Scientific Advisory Committee of the Australian (ARC) Research Network on Intelligent Sensors and Information Processing Center, Australia |
| 2003-2007 | Member, Travel Grants Joint Selection Committee, Hong Kong Research Grant Council, Hong Kong |
| 1999-2006 | Member of the Engineering Panel, Hong Kong Research Grant Council, Hong Kong |

## MAJOR UNIVERSITY SERVICE AND COMMITTEES AT HKUST

| | |
|---|---|
| 2021- | Member, The Hong Kong University of Science and Technology Court |
| 2021-2022 | Member, Search Committee for the President of the Hong Kong University of Science and Technology |
| 2021-2022 | Chair, Search Committee for the Director of the State Key Laboratory of Advanced Displays and Optoelectronics Technologies |
| 2021-2022 | Member, Search Committee for the Director of the HKUST Robotics Institute |
| 2021 | Chair, ECE/MAE Joint Ad-Hoc Search and Appointment Committee |
| 2020 | Member, HKUST Guangzhou Campus IoT Thrust Committee |
| 2019- | Chair, ECE Department Search and Appointment Committee |
| 2019- | Member, ECE Department Executive Committee |
| 2019- | Member, ECE Department Planning/Resource Committee |
| 2019- | Member, HKUST Guangzhou Campus Development Board |
| 2018- | Chair, University Student Disciplinary Committee |
| 2018- | Member, The Hong Kong University of Science and Technology Senate |
| 2015 | Member, Associate Vice-President for Knowledge Transfer Search Committee |
| 2013 | Chair, Dean Xi'an Jiaotong University – Hong Kong University of Science and Technology Joint School of Sustainable Development Search Committee |
| 2012-2015 | Chair, University Committee on Teaching and Learning Quality |
| 2012-2013 | Member, University of the University Council |
| 2012-2013 | Member, University Senate Research Committee |
| 2011 | Chair, University Taskforce on Gender Diversity and Campus Culture |
| 2009-2015 | Member, University Committee on Research Infrastructure (CORI) |
| 2009-2015 | Member, University Campus Development and Accommodation Committee |

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|---|---|
| 2009-2015 | Chair, School Committee on Appointments of University Professor, Chair Professor and Named Professor |
| 2009-2015 | Member, University Administrative Committee |
| 2009-2012 | Member, University Steering Committee of Mainland Projects |
| 2009-2012 | Member, University Budget Committee |
| 2009-2014 | Member, IAS Academic Working Group |
| 2009 | Chair, University Working Group for the 4-Year Curriculum Development |
| 2008-2011 | Member, Vice-President for Research and Graduate Studies Search Committee |
| 2008-2009 | Chair, Industrial Engineering and Engineering Management Department Head Search Committee |
| 2007-2009 | Member, University Committee on Appointments of University Professor, Chair Professor and Named Professor |
| 2007-2008 | Chair, Computer Science and Engineering Department Head Search Committee |
| 2006-2007 | Member, Vice-President for Academic Affairs (Deputy to the President) Search Committee |
| 2006-2009 | Member, Applied Technology Center Review Committee |
| 2006 | Chair, University Task Force on College of Lifelong Learning |
| 2005-2006 | Chair, Chemical Engineering Department Head Search Committee |
| 2003 | Member, Dean of Engineering Search Committee |
| 2001-2002 | Chair, Electrical & Electronic Engineering Department Search Committee |
| 2001-2002 | Chair, Electrical & Electronic Engineering Department Academic Review Committee |
| 2001-2002 | Chair, School of Engineering Direct Allocation Grant Committee |
| 2000 | Member, University Selection Committee for the Michael Gale Teaching Award |
| 1999-2015 | Member, University Senate |
| 1999-2000 | Member, Engineering School Research Committee |
| 1996-2000 | Member, Member of the University Admissions, Registration and Records Office Advisory Committee |
| 1998-2002 | Member, Electrical & Electronic Engineering Department Academic Review Committee |
| 1998-2009 | Member, University Technology Review Committee |
| 1997 | Member, Senate Task Force on Teaching Evaluation |
| 1995-1998 | Member, Engineering School Undergraduate Studies Committee |
| 1995-1998 | Director, Electrical & Electronic Engineering Undergraduate Studies Program |
| 1994 | Member, Engineering Task Force on Teaching and Learning |
| 1993-1994 | Member, Electrical & Electronic Engineering Accreditation Committee |

## INTERNATIONAL DISTINCTION AND HONOR

- *AMiner Award*, AI 2000 Most Influential Scholar Honorable Mention in Internet of Things, 2022
- *Member* (International), United States National Academy of Engineering (NAE), 2021
  - Election to the National Academy of Engineering is among the highest professional distinctions accorded to an engineer.  Academy membership honors those who have made outstanding contributions to "engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature" and to "the pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education."
- *Fellow*, Hong Kong Academy of Engineering Sciences (*HKAES*), 2020
  - HKAES is an organization of Hong Kong's most eminent engineers of various disciplines who are recognized leaders of the profession with distinguished achievements in engineering sciences or applications. Fellows are elected by their peers for personal achievements of exceptional merit and distinction.
- *National President Award for Best Tunisian Researcher living abroad*, 2020
  - Prize given by the Tunisian President in a ceremony at the Presidential Palace with a maximum of one award given every year based upon a review of a national committe
- *AI 2000 Internet of Things Most Influential Scholars*, 2020

- Recognized among the top 30 worldwide list of AI 2000 Most Influential Scholars which lists the most cited scholars from the top-tier publications on Internet of Things over the past 10 years (2009–2019).
- *Distinguished Research Excellence Award,* HKUST, 2019
    - The most prestigious research excellence award given by the School of Engineering and only one faculty recipient is selected over a period of 3 years (one award per three years)
- *ISI HIGHLY CITED RESEARCHER* (Thomson Reuters), 2011
    - Among the top 250 preeminent individual researchers worldwide in the field of Computer Science & Engineering. ISI Highly Cited Researchers are individuals that are the most highly cited within each category (21 fields in total), and comprise less than one-half of one percent of all publishing authors.
- *Fellow*, IEEE since 2003
    - For any single year, elected fellows cannot exceed one-tenth of 1 percent of the voting membership, which is more than 425,000 professionals in more than 160 countries
- *Fellow*, Hong Kong Institution of Engineers (*HKIE),* since 2013
- *keynote* and plenary talks around the world
- Invited Speaker at the *World Economic Forum* (WEF) in *Davos*, Switzerland, January 2015
- David Ross Fellowship at Purdue University, 1986-1988.

## INTERNATIONAL AWARDS

- Recipient, 2021 *IEEE Technical Committee on Cognitive Networks Recognition Award*
- Recipient, 2021 *IEEE* Communications Society *Best Survey Paper Award*
- Recipient, 2019 *IEEE* Communications Society and Information Theory Society *Joint Paper Award*
- Recipient, 2018 *IEEE* Signal Processing Society *Young Author Best Paper Award*
- Recipient, 2017 *IEEE Technical Committee on Cognitive Networks Publication Award*
- Recipient, 2016 *IEEE Marconi Prize Award in Wireless Communications*
- Recipient, 2016 IEEE Signal Processing Society *Young Author Best Paper Award*
- Recipient, 2011 *IEEE Technical Committee on Wireless Communications Recognition Award*
- Recipient, 2011 *IEEE* Communications Society *Harold Sobol Award*
- Recipient, 2010 *Purdue University Outstanding* Electrical and Computer *Engineer Award*
- Recipient, 2009 *IEEE Marconi Prize Award in Wireless Communications*
- Recipient, 2007 *IEEE* Communications Society *Joseph LoCicero Publications Exemplary Award*
- Recipient, 1992 URSI Young Scientist Award, Paris, France

## TEACHING DISTINCTION AND AWARDS

- 1998 University *Michael G. Gale Medal* for Distinguished Teaching- *Highest university-wide Teaching Award*
    *This gold medal is established to recognize excellence in teaching and only one recipient/year*
    *is honored for his/her contributions at HKUST.*
- Teaching Excellence Appreciation Award, School of Engineering, HKUST, Spring 1999
- Teaching Excellence Appreciation Award, School of Engineering, HKUST, Fall 1997
- *Special Mention* by HKUST Senate in October 1997 in recognition of dedication to teaching.
    The mention states that
    *"… Dr. K. Ben Letaief is one of three "finalists" for the 1997 Michael G. Gale Award and*
    *that it was very difficult for the selection committee to choose among the finalists even after*
    *making class visits to the three finalists. The three finalists deserve the congratulations and*
    *gratitude of the Senate for their excellent work and dedication to teaching."*
- Teaching Excellence Appreciation Award, School of Engineering, HKUST, Fall 1996
- Teaching Excellence Appreciation Award, School of Engineering, HKUST, Spring 1995
- *Special Mention* by HKUST Senate in October 1995 in recognition of teaching excellence.
    The mention states that

> *"... In addition to high quality teaching, Dr. Ben Letaief has made a significant contribution to his Department's teaching program through the development and supervision of new laboratory courses."*

- Mangoon Award for Best Graduate Instructor, Purdue University, May 1990.

## BEST PAPER AWARDS

1. Haina Zheng, K. Xiong, P. Fan, Z. Zhong, and K. B. Letaief, "Minimum age-energy aware cost in wireless powered fog computing networks," *IEEE International Communications Conference* (ICC'2020), Dublin, Ireland, June 2020.

2. Xianghao Yu, Jun Zhang, and K. B. Letaief, "Hybrid precoding in millimeter wave systems: How many phase shifters are needed?," *IEEE Global Communications Conference* (GLOBECOM'2017), Singapore, Dec. 2017.

3. Y. Mao, C. You, J. Zhang, K. Huang, and K. B. Letaief, "A survey on mobile edge computing: The communication perspective," *IEEE Communications Surveys & Tutorials,* vol. 19, no. 4, pp. 2322-2358, 2017.

4. Juan Liu, Bo Bai, Jun Zhang, and K. B. Letaief, "Content Caching at the Wireless Network Edge: A Distributed Algorithm via Belief Propagation," *IEEE International Communications Conference* (ICC'2016), Kuala Lumpur, Malaysia, June 2016.

5. Xianghao Yu, Juei-Chin Shen, Jun Zhang, Khaled B. Letaief, "Alternating minimization algorithms for hybrid precoding in millimeter wave MIMO systems" *IEEE Journal of Selected Topics in Signal Processing*, Volume 10, no. 3, April 2016.

6. Y. Shi, J. Zhang, B. O'Donoghue, and K. B. Letaief, "Large-scale convex optimization for dense wireless cooperative networks," *IEEE Transactions on Signal Processing*, vol. 63, no. 18, pp. 4729-4743, Sep. 2015.

7. Y. Shi, J. Zhang, and K. B. Letaief, "Group Sparse Beamforming for Green Cloud-RAN," *IEEE Transactions on Wireless Communications,* vol. 13, No. 5, pp. 2809-2823, May 2014.

8. Tao Li, Pingyi Fan, and K. B. Letaief, "Data Acquisition with RF-based energy harvesting sensor: From information theory to green system," *IEEE Global Communications Conference* (GLOBECOM'2014), Austin, TX, USA, Dec. 2014.

9. X. Peng, J.-C. Shen, J. Zhang, and K. B. Letaief, "Joint data assignment and beamforming for backhaul limited caching networks," *IEEE Int. Symp. on Personal Indoor and Mobile Radio Comm. (PIMRC),* Washington, DC, USA, Sept. 2014.

10. K. Hamdi, X. N. Zeng, A. Ghrayeb, and K. B. Letaief, "Impact of Noise Power Uncertainty on Cooperative Spectrum Sensing in Cognitive Radio Systems," *IEEE Global Communications Conference (GLOBECOM'2010)*, Miami, Florida, USA, Dec. 2010.

11. Qing Wang, Pingyi Fan, M. Mckay, and K. B. Letaief, "On the Selection of Relays' Positions in Diamond Relay Networks" *IEEE/ACM IWCMC '10*, Caen, France, July 2010.

12. Shaolei Ren and K. B. Letaief, "Minimum Sum Expected Distortion in Cooperative Networks", *IEEE International Communications Conference* (ICC'2009), Dresden, Germany, June 2009.

13. Wei Chen, Lin Dai, K. B. Letaief, and Zhigang Cao, "A Unified Cross-Layer Framework for Resource Allocation in Cooperative Networks," *IEEE Transactions on Wireless Communications*, vol.7, no. 8, pp. 3000-3012, Aug. 2008.

14. Feng Han, Pingyi Fan, Q.T. Zhang, K. B. Letaief, "On energy spreading transform based MIMO systems: Capacity and diversity" *IEEE Wireless Communications and Networking Conference* (WCNC'08), Las Vegas, USA, April 2008.

15. W. Zhang and K. B. Letaief, "Bandwidth efficient cooperative diversity for wireless networks," *IEEE Global Communications Conference* (GLOBECOM'2007), Washington, DC, USA, Nov. 2007.

16. W. Chen, Z. Cao, and K. B. Letaief, "Optimal delay-power tradeoff in wireless transmission with fixed modulation," *International Workshop Cross Layer Design*, Jinan, China, Sept. 2007.

17. Ernest S. Lo and K. B. Letaief, "Cooperative concatenated coding for wireless systems," *IEEE International Conference on Communications* (ICC'2007), Glasgow, Scotland, UK, June 2007.

18. W. Chen, K. B. Letaief, and Z. Cao, "A cross-layer method for interference cancellation and network coding," *IEEE International Conference on Communications* (ICC'2006), Istanbul, Turkey, June 2006.

19. K. K. Wong, S. K. Lai, R. S. Cheng, K. B. Letaief, and R. D. Murch, "Adaptive spatial-subcarrier trellis coded MQAM and power optimization for OFDM transmission," *IEEE Vehicular Technology Conference* (VTC'2000)*, Tokyo, Japan, May 2000.

## KEYNOTES AND PLEANARY TALKS

1. "The road to 6G," *IEEE Asia Pacific Conference on Communications* (APCC'2021), Kuala Lumpur, Malaysia, 10-13 Oct. 2021.

1. "Towards Integrated Intelligence for a Connected World," *IEEE/CIC International Conference on Communications in China* (ICCC'2021), Xiamen, China, 28-30 July, 2021.

2. "Connected Intelligence for 6G," Global 6G Conference, Beijing, China, Sept. 2020.

3. "From Connected Things to Connected Intelligence for 6G Wireless Systems," *International Conference on Communications, Signal Processing and their Applications* (ICCSPA'2020), UAE, April 2020.

4. "AI Empowered Wireless Networks and the Road to 6G," *IEEE International Conference on IoT Embeded Systems and Communications* (IINTEC'2019), Dec. 2019.

5. "AI Empowered Wireless Networks," *International Workshop on Advances in Information Coding and Wireless Communications* (AICWC'2019), Oct. 2019

6. "Artificial Intelligence for Wireless Network Optimization," *International Conference on ICT Convergence* (ICTC'19), Jeju Island, Korea, Oct. 2019.

7. "Deploying 5G – Challenges from Technology and Talent Perspectives," 5G & IoT Forum, Hong Kong, March 2019.

8. "5G Cellular Communications: Advances and Future Evolution," STEP'2018, Muscat, Oman, Dec. 2018.

9. "Disruptive Technologies for 5G – The Next Wireless Frontier," *IEEE/CIC International Conference on Communications in China* (ICCC), Shenzhen, China, Nov. 2015.

10. "The Race for 5G," *National Forum on Emerging Wireless Technologies and Open Innovations* (NEWTON Forum), Nov. 2015.

11. "The Road to 5G: Challenges and Disruptive Technologies," IWCIT'2015, 6-7 May, 2015.

12. "Communications of All Things for a Connected Living," *World Economic Forum* (WEF 2015), Davos-Klosters, Switzerland, 22-25 Jan. 2015.

13. "Wireless Evolution Beyond 2020," *Wireless Days 2014*, Rio de Janeiro, Brazil, Nov. 2014.

14. "Towards Emerging 5G Wireless Broadband Systems," *2013 IEEE International Workshop on Signal Processing Advances for Wireless Communications* (SPAWC'2013), Darmstadt, Germany, June 2013.

15. "Preparing Leaders for Ultimate Success," *2013 World Congress on Engineering Education* (CDEE'2013), Doha, Qatar, Jan. 2013.

16. "A Look into Next-Generation Wireless Networks," *2012 IEEE Saudi Exchange Meeting* (STEM'2012), Dhahran, Dec. 2012.

17. "Wireless Networks: A Look into the Future," *International Conference on Wireless Communications and Signal Processing* (WCSP'2012), Huangshan (Yellow Mountain), China, Oct. 2012.

18. "A Look into the Future of Wireless Communications," *2013 International Symposium on Wireless Personal Multimedia Communications* (WPMC'12), Taipei, Taiwan, Sept. 2012.

19. "Wireless Communications: A look into the Future," *2012 Information and Communication Technology Research Forum* (ICTRF'2012), Abu Dhabi, UAE, 20 May 2012.

20. "The Internet of Things: The Next Wireless Revolution," *IEEE Asia-Pacific Conference on Communications*, Kota Kinabalu, Malaysia, 2-5 Oct., 2011.

21. "Towards the Internet of Things," *Texas A&M University at Qatar, Doha*, Qatar, 26 April, 2011.

22. "The Quest for Realizing the Ultimate Wireless Revolution," *2010 International Conference on Cognitive Sensor Networks and Embedded Systems* (CoNES'2010), Wuhan, China, Oct. 23-24, 2010.

23. "Future Education in Technology and Engineering," *2010 Forum on Future Information Science, Technology and Education*, Fudan University, Shanghai, China, Oct. 17, 2010.

24. "Towards a New World of Cognitive and Agile Networks," *2010 IEEE Wireless Communication and Networking Conference* (WCNC'10), Sydney, Australia, April 18-21, 2010.

25. "Realizing the Anything Anybody Anywhere Anyhow Anytime' Ultimate Wireless Revolution", *2009 IEEE International Conference on Wireless and Mobile Computing, Networking and Communications* (WiMob), Marrakech, Morocco, Oct. 12-14, 2009.

26. "The Quest for Realizing the Ultimate Wireless Dream*," 2009 IEEE Symposium on Computers and Communications*, (ISCC'09), Sousse, July 5-8, 2009.

27. "Changing the Fabric Communications: The quest for realizing the ultimate wireless revolution*," 2009 IEEE-GCC Conference*, Kuwait, Mar. 17-19, 2009.

28. "Pathways towards Next Generation Cognitive Ubiquitous Networks." *2009 International Conference on Communications and Mobile Computing* (CMC 2009), Kunming, China, Jan. 6-8, 2009.

29. "A New Wireless World of Cognitive and Agile Networks," *Huawei Wireless Symposium* (HWS'2008), Shanghai, China, Dec. 9-10, 2008.

30. "The Next Wireless Revolution," *IEEE International Conference on Communications Systems* (ICCS 2008), Guangzhou, China, Nov. 19-21, 2008.

31. "Effect of Globalization on ECE Profession and Education," *2008 National Science Foundation/Electrical and Computer Engineering Department Heads Association Globalization Workshop*, San Diego, CA, USA, Mar. 2008.

32. "Internationalization Perspective on ECE Education and Academic Research," *2008 Electrical and Computer Engineering Department Heads Association Conference*, San Diego, CA, USA, Mar. 2008.

33. "Ubiquitous Broadband," IEEE Asia-Pacific Conference on Communications, Bangkok, Thailand, Oct. 2007

34. "Cross-layer dynamic multiuser resource allocation and adaptation for wireless networks," *International Workshop on Network Security and Wireless Communications,*" Sendai, Japan, Jan. 2007.

35. "Ubiquitous broadband communications: The next frontier," *ACS/IEEE International Conference on Computer Systems and Applications*, Dubai/Sharjah, United Arab Emirates, Mar. 8-11, 2006.

36. "Capacity Enhancing Technologies for the XG wireless Networks," *IEEE International Symposium on Wireless Pervasive Computing*, Phuket, Thailand, Jan. 16-18, 2006.

37. "3G Applications: Opportunities, Challenges, and Enabling Technologies," *Hong Kong Government 3G on the Move Conference and Exhibition*, Hong Kong, Oct. 28, 2005.

38. "3G wireless systems and beyond," *IEEE Information and Communication Technologies International Symposium*, Tetouane, Morocco, June 3-6, 2005.

39. "Ubiquitous Broadband Mobile Communications," *IASTED International Conference on Networks and Communication Systems*, Krabi, Thailand, Apr. 18-20, 2005.

40. "Migration Towards 4G Wireless Networks," *IEEE/IFIP International Conference on wireless and Optical Communications Networks*, Dubai, United Arab Emirates, Mar. 6-8, 2005.

41. "Wireless Communications at a Crossroads," *IEEE International Symposium on Control, Communications and Signal Processing*, Hammamet, Tunisia, March 21-24, 2004.

42. "Bridging the Digital Divide - Wireless Opportunities, *2003 United Nation WFEO/CIC World Congress: Engineering and Digital Divide*, Tunis, Tunisia, Oct. 14-16, 2003.

43. "Wireless Communications: Evolution and Opportunities," *Arab Symposium for Communications*, Beirut, Lebanon, Oct. 30-31, 2002.

44. "Broadband Wireless Access," *China Wireless Congress*, Hangzhou, China, Oct. 15-17, 2002.

## INDUSTRY STANDARDS CONTRIBUTIONS

The IEEE 802 LAN/MAN is a family of standards which represent the main worldwide Local Area Network standards and Metropolitan Area Network standards. These include the most widely used standards for the Ethernet family, Token Ring, Wireless LAN, Wireless PAN, Wireless MAN, and Bridging LANs.

The IEEE 802.22 is among the family of IEEE 802 standards, which aims at constructing wide area networks utilizing the concept of cognitive radio to provide point to multipoint fixed broadband wireless access in wide area networks. The following are technical contributions that were accepted as part of the standard

1. V. K. N. Lau, R. S. Cheng, R. D. Murch, W. H. Mow, K. B. Letaief, L. Lu, S.-Y. Chang, J. Zhang, L. Qian, J. Wen, E. K. S. Au, P. W. C. Chan, R. R. Wang, T. Wu, Z. Wu, J. Rong, J. Jiao, and M. Jie, "MAC management message for efficient sensing," *IEEE802.22 document No. 22-06-0224-00-0000*, Mar. 2007.

2. V. K. N. Lau, R. S. Cheng, R. D. Murch, W. H. Mow, K. B. Letaief, L. Lu, S.-Y. Chang, J. Zhang, L. Qian, J. Wen, E. K. S. Au, P. W. C. Chan, E. S. Lo, C. Wang, Z. Wu, J. Rong, J. Jiao, and M. Jie, "Overhead reduction for downstream burst: a refined DS-MAP message," *IEEE802.22 document No. 22-06-0225-00-0000*, Jan. 2007.

3. V. K. N. Lau, W. H. Mow, R. S. Cheng, R. D. Murch, K. B. Letaief, L. Lu, S.-Y. Chang, J. Zhang, L. Qian, J. Wen, T. Wu, S. M. Mok, E. K. S. Au, Z. Wu, J. Rong, J. Jiao, and M. Jie, "Combined MCS, mode and precoder design for point to point MIMO in WRAN with limited CSI feedback," *IEEE802.22 document No. 22-07-0040-00-0000/22-07-0041-00-0000*, Jan. 2007.

4. V. K. N. Lau, W. Hu, W. H. Mow, G. Vlantis, R. S. Cheng, R. D. Murch, K. B. Letaief, L. Lu, S.-Y. Chang, J. Zhang, L. Qian, J. Wen, R. R. Wang, E. K. S. Au, T. Wu, Z. Wu, J. Rong, J. Jiao, and M. Jie, "MAC management messages for reliable inter-BS communication," *IEEE802.22 document No. 22-07-0051-00-0000*, Jan. 2007.

5. V. K. N. Lau, W. H. Mow, R. S. Cheng, R. D. Murch, K. B. Letaief, L. Lu, S.-Y. Chang, J. Zhang, L. Qian, J. Wen, T. Wu, E. S. Zhang, E. K. S. Au, T. Wu, J. Rong, J. Jiao, and M. Jie, "An incumbent protecting initialization procedure," *IEEE802.22 document No. 22-07-0046-00-0000/22-07-0047-00-0000*, Jan. 2007.

6. V. K. N. Lau, W. H. Mow, R. S. Cheng, R. D. Murch, K. B. Letaief, L. Lu, S.-Y. Chang, J. Zhang, L. Qian, J. Wen, R. R. Wang, E. K. S. Au, Z. Wu, J. Rong, J. Jiao, and M. Jie, "Soft hybrid ARQ design with adaptive frequency interleaving for WRAN systems," *IEEE802.22 document No. 22-07-0038-00-0000/22-07-0039-00-0000*, Jan. 2007.

# PATENTS

1. Chunhua Sun, Wei Chen, and K. B. Letaief, "Fair and efficient channel allocation and spectrum sensing for cognitive OFDMA networks," US Patent, No. 8,774,111, July 2014.

2. W. Zhang and K. B. Letaief, "Full-rate distributed space-time codes for cooperative communications," US Patent, No. 8,542,760, Sept. 2013.

3. C. Sun, W. Zhang and K. B. Letaief, "Cluster-Based Cooperative Spectrum Sensing for Cognitive Radio Systems, US Patent, No. 7,965,641, Feb. 2014; Korean Patent No. KR101277816B1, June 2013; Chinese Patent No. CN101765986B, Aug. 2013.

4. S. Y. Lo and K. B. Letaief, "Optimizing downlink throughput with user cooperation and scheduling in adaptive cellular networks," US Patent, No. 8,416,729, Sept. 2013; Japanese Patent. No. JP5433767, Dec. 2013; Chinese Patent No. CN101702965 B, March 2012; Korean Patent No. KR101244553, March 2013.

5. S. Y. Lo and K. B. Letaief, "Cooperative concatenated coding for wireless systems," US Patent, No. 8,95,456, June 2012; Japanese Patent. No. JP5259696B2, Aug. 2013; Korean Patent No. KR101332528B1, Nov. 2013; Chinese Patent No. CN102084615 B, July 2014; Hong Kong Patent No. HK1155591, May 2012.

6. W. Zhang and K. B. Letaief, "Multiuser scheduling for MIMO broadcast channels with finite rate feedback," US Patent, No. 8,054,837, Nov. 2011; Korean Patent No. KR101286877B1, July 2013.

7. K. Hamdi, W. Zhang and K. B. Letaief, "Power control in cognitive radio systems based on spectrum sensing side information, US Patent, No. 8,041,380, Oct. 2011; Korean Patent No. KR101319962B1, Oct. 2013; Chinese Patent No. CN101803431B, June 2013.

8. K. B. Letaief and W. Zhang, "Robust cooperative spectrum sensing for cognitive radios," US Patent, No. 7,965,641, June 2011; Korean Patent No. KR101162446B1; Hong Kong Patent No. HK1157560, July 2012.

9. Y. Zhu and K. B. Letaief, "Frequency domain equalization with transmit precoding for high speed data transmission," US Patent, No. 11/939,684, Nov. 2007.

10. W. Zhang and K. B. Letaief, "Bandwidth efficient cooperative diversity technique for wireless relay networks," US Patent, No. 11/941,293, Nov. 2007.

11. W. L. Huang and K. B. Letaief, "Cross-layer multi-packet reception based medium access control and resource allocation for space-time coded MIMO/OFDM," European Patent, EP20080872226, Sept. 2008.

12. Y. Zhu and K. B. Letaief, "Hybrid Time-frequency domain equalization over broadband multi-input multi-output channels," US Patent, No.11/758873, June 2007.

13. K. B. Letaief, J. C-I Chuang, and R. D. Murch, "High speed Data Transmission using Expanded Bit Durations in Multiple Parallel Coded Data," US Patent No. 5,960,032, Sept. 1999.

14. J. Li, K. B. Letaief, and Z. Cao "Method and Apparatus for Multiuser Detection using Sensitive Bits Algorithm," China Patent No. 03120820.7, Registered 21 March 2003.

15. J. Li, K. B. Letaief, and Z. Cao, "Method and Apparatus for Space-time Turbo multiuser detection using Sensitive Bits algorithm and Spatial classification," China Patent No. 03109124.5, Registered 11 April 2003

## TECHNOLOGY CONSULTING

- Huawei Ltd, China, "AI for 6G wireless networks," 2021-22.
- Applied Science and Technology Research Institute, Hong Kong, "Intelligent control for 5G radio access networks," 2021.
- Applied Science and Technology Research Institute, Hong Kong, "LTE vehicle-to-everything (V2X) communications," 2017-18.
- Coway Co. Ltd., South Korea, "Cyber-Physical Devices," 2012-13
- Applied Science and Technology Research Institute, Hong Kong, "Compact MIMO," 2008-09.
- Huawei Ltd, China, "Design of mobile WiMAX Systems (802.16m)," 2008-2012.
- Applied Science and Technology Research Institute, Hong Kong, "Reconfigurable OFDM design for WiFi and WiMax," 2006-07.
- Huawei Ltd, China, "Cognitive radio and spectrum sensing in IEEE 802.22 WRAN", 2006-07.
- Applied Science and Technology Research Institute, Hong Kong, "Practical MIMO design for WiFi and WiMax," 2005-07.
- PricewaterhouseCoopers LTD, Hong Kong, "Mobile Radio Spectrum Study," 2005.
- ZTE, China, "B3G and 4G wireless systems," 2004.
- ETRI, Korea, "Capacity enhancement of MIMO/OFDM systems," 2002.
- Nortel, Ltd., "Indoor Measurement for PCS services," Hong Kong, 1998.
- Motorola Semiconductor Hong Kong, Ltd., "On IS-95 Cellular Mobile Standard," Hong Kong, 1996.
- EDN Asia, "On high-speed transmission techniques for wireless communications," 1995.

## REPRESENTATIVE GRANTS

Secured a total of over 65 competitive grants with significant funding from government agencies and major industry (Project manager on most projects). The following is a **sample list** of grants received

1. "6G: Wireless Access and Connectivity for an Intelligent and Sustainable World," RGC Area of Excellence Proposal AoE/E-601/22-R
   *Investigators*: K. B. Letaief (*Project Manager*) and 10 PIs; $93,086,000 *Requested for 2022-27.*

2. "Deep Learning-Empowered Ultra-Massive MIMO for Future THz Communications," RGC CERG HKUST 16211922.
   *Investigators*: K. B. Letaief (*Project Manager*); $1,197,393 *Requested for 2023-25.*

3. "Towards Communication-Efficient Federated Edge Learning in Future Wireless Communication Systems," RGC CERG HKUST 16208921.
   *Investigators*:     K. B. Letaief (*Project Manager*); $838,393 *Granted for 2022-24.*

4. "IRS Enhanced Millimeter-Wave Wireless Communications for 6G Wireless Networks," Shenzhen Science and Technology Innovation Committee (SZSTI)
   *Investigators*:     S. Song (*Project Manager*), K. B. Letaief, and X. Yu; RMB$1,100,000 *Granted for 2022-24.*

5. "6G: Towards Integrated Intelligence for a Connected World," Hong Kong University of Science and Technology,
   *Investigators*:     K. B. Letaief (*Project Manager*); $1,000,000 *Granted for 2021-23*

6. "Intelligent Control for 5G O-RAN Funding," Hong Kong Applied Science and Technology Research Institute Company Limited (ASTRI),
   *Investigators*:     K. B. Letaief (*Project Co-Manager*); S. H. Song (*Project Co-Manager*), and X. Yu; $495,000 *Granted for 2021-22*

7. "Edge AI for Wireless Communications Systems," Huawei 20210400L016, $3,419,231 Granted for 2020-22
   *Investigators*:     K. B. Letaief (*Project Co-Manager*), Jun Zhang, and Shenghui Song; $3,419,231*Granted for 2020-22*

8. "Ubiquitous Cell-Free Massive MIMO for Future Wireless Communications," RGC CERG HKUST 16212120
   *Investigators*:     K. B. Letaief (*Project Co-Manager*); $1,057,394 *Granted for 2021-23.*

9. "Learn to Optimize for Scalable Resource Allocation in Cooperative Dense Wireless Networks," RGC CERG HKUST 16210719
   *Investigators*: K. B. Letaief (*Project Manager*); *$673,470 Granted for 2020-22.*

10. "IoT/Smart City: Communication Networks and Data Analytics for Intelligent Transportation Systems," ITS/447/16FP
    *Investigators*: S. C. Liew (*Project Manager*), *D. T. Tsang, K. B. Letaief, V. O. Li, and V. Chan; $8,729,929 Granted for 2017-19.*

11. "Optical Wireless communications: Complementary Technology for Solving RF Spectrum Congestion in 5G Heterogeneous Networks," QNRP Qatar
    *Investigators*: K. Qaraqe (*Project manager*), *K. B. Letaief, M. Abdallah, M-S Alouini, Z. Rezki, and M. Khairy*; *$7,200,000 Granted for 2016-19.*

12. "Cloud-RAN: A New Design Paradigm for Cooperative Wireless Networks," RGC CERG HKUST 610214)
    *Investigators*: K. B. Letaief (*Project Manager*); *$692,894 Granted for 2014-17.*

13. "Interference Management for Next-Generation Heterogeneous Networks," RGC CERG HKUST 610213)
    *Investigators:* K. B. Letaief *(Project Manager); $836,450 Granted for 2013-15.*

14. "Green Cooperative Communications for Future Wireless Networks," RGC CERG HKUST 610212)
    *Investigators:* K. B. Letaief *(Project Manager); $700,000 Granted for 2012-14.*

15. "Interference-Aware Coordination for Next-Generation Wireless Networks," (RGC CERG HKUST 610311)
    *Investigators*: K. B. Letaief (*Project Manager*); *$1,292,370 Granted for 2012-14.*

16. "Opportunistic Spectrum Utilization in Cognitive Radio: Towards the Communication Utopia" (Qatar Foundation Grant, NPRP 09-126-2-054)
    *Investigators*: K. B. Letaief (*Project Manager*); *$1,428,016 Granted for 2011-13.*

17. "Location aware dynamic spectrum sharing for cognitive wireless networks," (RGC CERG 610309)
    *Investigators:* K. B. Letaief *(Project Manager); $625,517 Granted for 2010-12.*

18. "Traffic scheduling and rate adaptation for IEEE 802.11n MIMO wireless networks," (RGC CERG 610307)
    *Investigators:* K. B. Letaief *(Project Manager) and M. Hamdi; $369,600 Granted for 2008-09.*

19. "Making Hong Kong a high-technology leader in wireless communications product innovations and services through world-class fundamental and applied research," (AOE-MG/E-09/06)
    *Investigators:* K. B. Letaief *(Project Manager); $2,500,000 Granted for 2007-11.*

20. "Cooperation and cross-layer design in cognitive radio systems," (NSFC/RGC Grant N_HKUST622/06)
    *Investigators:* K. B. Letaief *(Project Manager); $500,500 Granted for 2007-10.*

21. "Cooperative diversity for ad-hoc wireless networks," (RGC CERG 610406)
    *Investigators*: K. B. Letaief (*Project Manager*); $960,048 Granted for 2007-09.

22. "Wireless IC system Design center," (NRC06/07.EG02)
    *Investigators:* K. B. Letaief *(Project Manager); $8,876,000 Granted for 2006-09.*

23. "Design and Performance Analysis of 802.22 Systems," (Industrial Contract with Huawei)
    *Investigators:* K. B. Letaief *(Project Manager) and other faculty; $1,000,000 Granted for 2006-07*

24. "Frequency domain equalization for single-carrier broadband wireless communications," (RGC CERG 610205)
    *Investigators:* K. B. Letaief *(Project Manager); $359,224 Granted for 2005-06*

25. "Compact Antennas," ASTRI (ASTRI-KBL 003.05/06)
    *Investigators:* K. B. Letaief *(Project Manager), R. Cheng, V. Lau, and R. Murch; $1,500,000 Granted for 2005-06*

26. "Reconfigurable OFDM," ASTRI (ASTRI-KBL 001.05/06)
    *Investigators*: K. B. Letaief (*Project Manager*), *C. Y. Tsui, R. Cheng, V. Lau, and W. H. Mow; $800,000 Granted for 2005-06*

27. "Practical MIMO," ASTRI (ASTRI-KBL 002.05/06)
    *Investigators*: K. B. Letaief (*Project Manager*), *R. Cheng, V. Lau, and R. Murch; $700,000 Granted for 2005-06*

28. "Integrated layer adaptation and design for wideband OFDM packet networks with QoS provisioning," RGC (CERG)
    *Investigators:* K. B. Letaief *(Project Manager) and M. Hamdi; $974,719 Granted for 2004-06*

29. "Design and Performance Analysis of B3G systems Radio Interface," (Industrial Contract with ZTE)
    *Investigators:* K. B. Letaief *(Project Manager) and other faculty; $821,100 Granted for 2004-05*

30. "Ultra-Wideband Wireless Communications for Multimedia Applications," Emerging High Impact Area Grant, HKUST
    *Investigators:* K. B. Letaief *(Co-Investigators) and other faculty; $1,000,000 Granted for 2004-05*

31.   *"Multiuser Resource Allocation for Broadband Multicarrier Wireless Networks,"* RGC (CERG)
      *Investigators:*      K. B. Letaief *(Project Manager); $817,404 Granted for 2002-05*

32.   *"Capacity Enhancement and Interference Cancellation in MIMO-OFDM Systems,"* ETRI, Korea
      *Investigators:*      K. B. Letaief *(Project Manager); $273,000 Granted for 2002-03*

33.   *"Space-time Coding for Wireless Communications,"* RGC (CERG)
      *Investigators*:      K. B. Letaief (*Project Manager*); $815,569 Granted for 2001-04

34.   "Wireless Communications," High Impact Area Grant, HKUST
      *Investigators*:      K. B. Letaief (*Project Manager*) *and other faculty; $800,000 Granted for 2001-2002*

35.   *"Wireless Multimedia Communications,"* Hong Kong Telecom Institute of Information technology
      *Investigators*:      K. B. Letaief (*Project Manager*), *R. S. Cheng, R. Murch, O. Au, M. Liou,*
                            *C. Y. Tsui, J. Lau, C. Ling, and M. Hamdi; $6,709,000 Granted for 1997-2000*

36.   *"CDMA Test Bed,"* Motorola Ltd.
      *Investigators*:      R. S. Cheng (*Project Manager),* K. B. Letaief, *R. D. Murch, and C. Y. Tsui; $1,441,000 for 1996-97*

37.   *"Wideband Wireless Personal Communications,"* HK Telecom Institute of Information technology
      *Investigators*:      K. B. Letaief (*Project Manager*), *J. Chuang, R. Murch, C. Ling, and T-M. Ko; $2,838,000 for 1995-97*

## RESEARCH SUPERVISION AND GRADUATE STUDENTS TRAINING

I have the privilege to supervise a large number of talented graduate students.  Most of my students were able to produce very high caliber research and publish their work in the most prestigious journals and conferences in our field.  Their career span not only industry and academia but also start-up companies all over the world (Hong Kong, China, Korea, Singapore, Australia, Middle-East, USA, Canada, United Kingdom, etc.)

### Master of Philosophy Theses Supervised

1.   Xinyi Zhang, "Multi-Objective Resource Allocation in Mobile Edge Computing Systems," *HKUST*, Dec. 2017.

2.   Changming Li, "Channel Training Techniques for TDD Massive MIMO Systems," *HKUST*, Dec. 2016.

3.   Umer Amin, "Energy Efficiency in Massive MIMO for Green Communications," *HKUST*, Aug. 2014.

4.   Chulsun Dan, "System Modeling and Analysis of the MAC protocol Split phase approach in Wireless Sensor Networks," HKUST, Dec. 2013.

5.   Xubo Zhao, "Interference Management for Two-Way Relay Networks," *HKUST*, Feb. 2013.

6.   Guoliang Chen, "Interference cancellation and PAPR reduction in single carrier frequency domain multiple access systems," *HKUST*, Aug. 2010.

7.   Shaolei Ren, "Cooperative wireless networks with QoS guarantees," *HKUST*, Aug. 2008.

8.   Karama Hamdi, "Interference avoidance in cognitive radio networks," *HKUST*, Aug. 2007.

9.   Chen Runhua, "A layered space-time coded MIMO architecture for high-data rate wireless communications," *HKUST*, Aug. 2002.

10.  Lo Sze Yuen, "Differential OFDM with iterative detection and signal space diversity for broadband wireless communications," *HKUST*, Aug. 2002.

11.  Nejib Boubaker, "A low complexity multicarrier layered space-time architecture for realizing high data rates," *HKUST*, Aug. 2001.

12.  Sana Sfar, "Layered space-time multiuser communication systems," *HKUST*, Aug. 2001.

13.  Tao Wai Yuk William (Co-supervised with Dr. R. S. Cheng), "Adaptive space-time coding for wireless systems," Aug. 2001.

14.  Qing Jiang Tian, "The performance of multi-carrier CDMA systems with/without multiple antennas," *HKUST*, Aug. 2000.

15.  Tao Li, "Blind space-time interference cancellation for DS/CDMA systems," *HKUST*, Aug. 2000.

16.  U Choi Lai (Co-supervised with Dr. R. D. Murch), "MIMO antenna systems for DS/CDMA communications," *HKUST*, Aug. 2000.

17.  Tin Tak Cheung, "Robust transcoder system for wireless image transmission," *HKUST*, Aug. 2000.

18.  Lap Wai Leung, "Joint space-time interference receivers with simplified complexity using pre-beamforming," *HKUST*, Aug. 2000.

19. Man Shui So (Co-supervised with Dr. R. S. Cheng), "Multiuser interference cancellation for coded CDMA communication systems," *HKUST*, Aug. 2000.

20. Tak Sang Wong, "Analysis and design of multiuser interference cancellation for high-data rate CDMA communication," *HKUST*, Aug. 1999.

21. Wong Cheong Yui (Co-supervised with Dr. R. S. Cheng), "Adaptive sub-Carrier, bit and power allocation for wireless multimedia using OFDM transmission," *HKUST*, Aug. 1999

22. Sai Kit Lai (Co-supervised with Dr. R. S. Cheng), "Adaptive Trellis Coded OFDM for High-Rate Data Transmission in Time-Varying Channels," *HKUST*, Aug. 1999

23. C. L. Ng, "Antenna diversity combining and equalization for high-speed wireless LANs," *HKUST,* Aug. 1997.

24. P. Kuganesan, "Parallel transmission for wideband wireless personal communications," *HKUST*, Aug. 1997.

25. C. W. Lo, "Adaptive equalization and interference cancellation for TDMA wireless communication Systems," *HKUST,* July 1997.

26. J. T. K. Tang, "Performance and design of optical CDMA communications systems with single-user and multiuser detection," *HKUST,* July 1997.

27. F. Y. Wong, "Performance and analysis of concatenated coded CDMA with applications to wireless multimedia communications," *HKUST,* June 1997.

28. Lai C. Andrew Hui, "Co-channel Interference Cancellation for DS/CDMA over Multipath Rayleigh Fading Channels," *HKUST,* Aug. 1996.

29. Kumar P. Halder, "Efficient Simulation of Spread-Spectrum Multiple-Access Systems over Multipath Rician and Rayleigh Fading Channels," *HKUST,* Feb. 1996.

30. Maurice C. C. Chan (Co-supervised with Dr. J. C-I Chuang), "*High-speed Transmission techniques for wireless communications*," *HKUST,* June 1996.

31. Khurram Muhammad, "New Performance Analysis Techniques for Coded Communications Systems Employing Sequential and Viterbi Decoders*," The University of Melbourne*, Jan. 1993.

32. Frank G. Hayward, "Analysis of Trellis-Coded Modulation Systems with Applications to Digital Cellular Mobile Communications," *The University of Melbourne*, Dec. 1993.

33. Damien A. Lee, "Performance Analysis Techniques for Fiber-Optic Communications Systems," *The University of Melbourne*, Oct. 1992.

## Ph.D. Theses Supervised

1. Yinghao Yu, "Towards Efficient, Fair and Load-Balanced Cluster Caching for Big Data Analytics," Aug. 2019 (with Alibaba, Hangzhou, China)

2. Xianghao Yu, "Hybrid Precoding for Millimeter Wave Wireless Communication Systems," Aug. 2018 (*with Humboldt Foundation, Germany).*

3. Zeng Jin (co-supervised with Prof Gene Cheung), "Processing of Irregularly Sampled Signals: Compression, Denoising and Quality Assessment," Jan. 2018 (*with SenseTime, Hong Kong).*

4. Xi Peng, "Cache-Assisted Communications in Backhaul-Limited Wireless Networks," Dec. 2017 (*with Huawei, Hong Kong*).

5. Yuyi Mao, "Design Methodologies for Green Communications and Mobile-Edge Computing Systems in 5G Networks." Aug. 2017 (*with ASTRI, Hong Kong*).

6. Rui Wang, " Cache-Assisted D2D Communications in Content-Centric Networks." Aug. 2017 (*with Microsoft, Beijing, China*).

7. Chang Li, "MIMO Heterogeneous and Small Cell Networks for 5G Systems", Mar. 2016 (*with NIST, Washignton, USA*).

8. Lu Yang, "Optimal Cognitive Spectrum Access for Macro-Femto Heterogeneous Networks", Nov. 2015 (*with ASTRI, Hong Kong*).

9. Yuanming Shi, "Scalable Sparse Optimization in Dense Cloud-RAN", Aug. 2015 (*with ShanghaiTech University, Shanghai, China*)

10. Yaming Luo, "Cooperative Transmission for Energy Harvesting Wireless Communication Systems", Aug. 2015 (*with ASTRI, Hong Kong*).

11. Xingyu Zhang (co-supervised with Prof Lu Fang), "Exploring Intra- and Inter-Color Correlation in High Efficiency Video Coding and Image Processing, Jan. 2015.

12. Ethan, Fangyong Li, "Location-Aware Spectrum Access and Sharing in Cognitive Radio Networks," Aug. 2014 (*with Huatai Financial Holdings, Hong Kong*).

13. Xiang Chen, "Cooperative relaying in Energy and spectrum efficient broadband wireless for networks," Aug. 2013 (*with ASTRI, Hong Kong*).

14. Liu Ying (Co-supervised with Prof. M. Mackay), "Outage performance of dual-hop fading relay channels," for MIMO relaying," Aug. 2013.

15. Karama Hamdi, "Spectrum sensing and sharing in cognitive radio networks," Dec. 2010 (*With Qatar University*).

16. Sunny Chunhua Sun, "Efficient and fair resource allocation for cognitive radio networks," Aug. 2010 (with *Huawei, China*).

17. Bo Bai (Co-supervised with Prof. Z. Cao), "Diversity-multiplexing tradeoffs for wireless networks," May 2010 (*With Tsinghua University, Beijing, China*).

16. Yi Shi, "Game-theoretic resource management for multi-hop interference networks," Aug. 2010 (*With Huawei, Canada).*

17. Zhiyao Ma (Co-supervised with Prof. Z. Cao), "Location-Aware Cognitive Radio," Aug. 2009.

18. Lo Sze Yuen, "Cooeprative and multiuser resource allocation for spectral-efficient wireless networks," Aug. 2008 (*With A&A Limited, Hong Kong*).

19. Weilan Huang, "Cross-layer design for ad hoc and infrstructered next-generation wireless networks," Aug. 2007 (*Member of Technical Staff, Nokia, Beijing, China*)

20. Yu Zhu, "Frequency domain equalization for single carrier broadband wireless communications," Aug. 2007 (*With Fudan University, Shanghai, China*).

21. Wei Chen (Co-supervised with Prof. Z. Cao), "Cross-layer design for wireless systems," 2006 (*Chair Professor at Tsinghua University, Beijing, China*).

22. Nejib Boubaker, "Design, analysis and performance evaluation of multi-access ultra wideband wireless communication systems," Aug. 2005 (*Associate Professor at Supcom, Tunisia*).

23. Sana Sfar, "Multiple array processing for achieving high capacity and high diversity gains for wireless MIMO systems," Aug. 2005 (*With Micorsoft, USA*).

24. Zhang Yingjun, "Adaptive Resource allocation with guaranteed QoS for broaband OFDM wireless networks," December 2004 (*Associate Professor at the Chinese University of Hong Kong*).

25. Defeng (David) Huang, "Low complexity diversity combining and carrier frequency offset compensation for ubiquitous OFDM based broadband wireless communications," Aug. 2004 (*Professor at the University of Western Australia, Australia*).

26. Johnny Ya-Han PAN, (Co-supervised with Prof. Z. Cao), "Adaptive modulation for wideband OFDM communications," May 2004 (*Professor in China*).

27. Yi Gong, "Space-time coding for high data-rate wireless communications over space and frequency selective fading channels," Sept. 2002 (*Professor at SUST*).

28. Junqiang Li (Co-supervised with Prof. Z. Cao), "space-time coding for wireless systems," Dec. 2001 (*Broadcom, USA*).

29. Guo Zi Hua, "Multiuser detection for wideband CDMA communications," Aug. 2001 (*R&D Research Director at Lenovo, China*).

30. Wong Kai Kit (Co-supervised with Dr. R. D. Murch), "Single and multiuser MIMO antenna systems for wireless communications," Aug. 2001 (*Reader at the University College London, UK*).

31. Baoguo Yang (Co-supervised with Prof. Z. Cao), "Channel estimation and synchronization in OFDM systems," Dec. 2000 (*Broadcom, USA*).

32. J. Lu, "Mobile image/video transmission for wireless multimedia communications," May 1998 (*Dean at Tsinghua University, Beijing, China*).

33. Y. Chen, "Equalization for high-speed transmission in wireless personal communications," Sept. 1997 (*Mobilink, USA*).

## MPhil Theses Supervised (In Progress)

1. Xianzheng Geng, "Joint offloading and path panning for UAV-assisted MEC," Co-supervised with Danny Tsang, Expected Aug. 2022.

## Ph.D. Theses Supervised (In Progress)

1. Wentao Yu, "Deep Learning in THz Communications," Expected Aug. 2025.

2. Ruoxiao Cao, "Localization in THz Communications," Expected Aug. 2025.

3. Yifei Shen, "Machine Learning for Resource Allocation Optimization," Expected Aug. 2022.

4. Lumin Liu, "Federated Learning for Resource Constrained Mobile Edge Computing Systems," Expected Aug. 2022.

5. Yifen Ma, "Big Data Analytics and Neural Calibration for Wireless Networks," expeted Aug. 2023.

6. Zhefeng Qiao, "Distributed Learning for wireless Networks," expected Aug. 2023.

## Master of Science (MSc) (Completed)

1. Chi-Wah CHEUNG
2. King-Sing David MAK
3. Sze-Keung Danny YIP

## RESEARCH PUBLICATIONS

### Publication Record Summary

| Career Total | No. Journals | No. Conferences |
|---|---|---|
| 703 | 329 | 374 |

**Citations** (Google Scholar as of 3 May, 2022)[‡]

| Lifelong Citations | Lifelong h-index | Lifelong i10-index |
|---|---|---|
| 41,417 | 90 | 408 |

### Books/Book Chapters

1. Xianghao Yu, Chang Li, Jun Zhang, and K. B. Letaief, "Stochastic Geometry Analysis of Multi-Antenna Wireless Networks," Springer, 2019.

2. Y. Shi, J. Zhang, K. B. Letaief, B. Bai and W. Chen, "Large-Scale Convex Optimization for C-RANs," in *Cloud Radio Access Networks: Principles, Technologies, and Applications*, Cambridge University Press, 2017.

3. Jianhua Lu, Xiaoming Tao, Ning Ge, and K. B. Letaief, "Structural Processing for Wireless Communications," Springer, 2015.

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### Refereed Journal Publications

1. Haina Zheng, K. Xiong, P. Fan, Z. Zhong, and K. B. Letaief, "Age of information-based wireless powered communication networks with selfish charging nodes," *IEEE Journal on Selected Areas in Communications*, to appear.

2. Ming Liu, J. Zhang, K. Xiong, M. Zhang, P. Fan, and K. B. Letaief, "Effective user clustering and power control for multi antenna uplink NOMA transmission," *IEEE Transactions on Wireless Communications*, to appear.

3. Ke Xiong, Y. Liu, L. Zhang, B. Gao, J. Cao, P. Fan, and K. B. Letaief, "Joint optimization of trajectory, task ofloading and CPU in UAV-assisted wireless powered fog computing networks," *IEEE Transactions on Green Communications and Networking*, early access, 2022.

4. Jinglian He, K. Yu, Y. Shi, Y. Zhou, W. Chen, and K. B. Letaief, "Reconfigurable intelligent surface assisted massive MIMO with antenna selection," *IEEE Transactions on Wireless Communications*, early access, 2021.

5. Ruihong Jiang, K. Xiong, H-C. Yang, P. Fan, Z. Zhong, and K. B. Letaief, "On the coverage of UAV-enabled SWIPT networks with nonlinear EH model," *IEEE Transactions on Wireless Communications*, early access, 2021.

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[‡] *Ranked among the top 4 in the world based upon the number of citations in the field of wireless.*

6.   Changkun Li, W. Chen, and K. B. Letaief, "Joint scheduling of proactive caching and on-demand transmission traffics over shared spectrum," *IEEE Transactions on Communications*, early access, 2021.

7.   Wenzhi Fang, Y. Jiang, Y. Shi, Y. Zhou, W. Chen, and K. B. Letaief, "Over-the-air computation via reconfigurable intelligent surface," *IEEE Transactions on Communications*, early access, 2021.

8.   Han Li, K. Xiong, Y. Lu, B. Gao, P. Fan, and K. B. Letaief, "Distributed design of wireless powered Fog computing networks with binary computation offloading," *IEEE Trans. Mobile Computing*, early access, 2021.

9.   Changkun Li, W. Chen, and and K. B. Letaief, "Achieving Low Latency in Massive Access: A Mean-field Approach," *IEEE Journal on Selected Areas in Communications*, vol. 40, no. 5, pp. 1473-1488, May 2022.

10.  Lingshan Liu, X. Ke, L. Liu, J. Cao, Y. Lu, P. Fan, and K. B. Letaief, "Average AoI minimization in UAV-assisted data collection with RF wireless power transfer: A deep reinforcement learning scheme," *IEEE Internet of Things Journal*, vol. 9, no. 7, pp. 5216-5228, Apr. 2022.

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12.  Y. Yu, C. Zhang, W. Wang, J. Zhang, and K. B. Letaief, "Towards dependency-aware cache management for data-parallel applications," *IEEE Transactions on Cloud Computing*, vol. 10, no. 1, pp. 706-723, Jan.-Mar. 2022.

13.  Ruichen Zhang, K. Xiong, Y. Lu, B. Gao, P. Fan, and K. B. Letaief, "Joint coordinated beamforming and power splitting ratio optimization in MU-MISO SWIPT-enabled hetNets: A multi-agent DDQN-based approach," *IEEE Journal on Selected Areas in Communications*, vol. 40, no. 2, pp. 677-693, Feb. 2022.

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10.    Shuo Wan, J. Lu, P. Fan, and K. B. Letaief, "Intelligent networking with mobile edge computing: Vision and challenges for dynamic network scheduling," under review in <u>*IEEE Wireless Communications Magazine*</u>.

## Refereed Conference Publications

1.    Yifei Shen, J. Zhang, and K. B. Letaief, "How neural architectures affect deep learning for communication networks?," *in Proc. IEEE Int. Conf. Commun. (ICC)*, Seoul, South Korea, May 2022.

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Dr. Letaief is an internationally recognized leader in wireless communications and networks with research interest in artificial intelligence, big data analytics systems, mobile cloud and edge computing, tactile Internet, 5G systems and beyond. In these areas, he has over 700 papers with over 41,410 citations and an *h*-index of 90 along with 15 patents, including 11 US inventions.

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Dr. Letaief is the recipient of many distinguished awards and honors including the 2021 IEEE Technical Committee on Cognitive Networks Recognition Award; 2021 *IEEE Communications Society Best Survey Paper Award*; 2019 *Distinguished Research Excellence Award* by HKUST School of Engineering (*Highest research award* and only one recipient/3 years is honored for his/her contributions); 2019 *IEEE Communications Society and Information Theory Society Joint Paper Award*; 2018 *IEEE Signal Processing Society Young Author Best Paper Award*; 2017 IEEE Technical Committee on Cognitive Networks Publication Award; 2016 *IEEE Signal Processing Society Young Author Best Paper Award*; 2016 IEEE Marconi Prize Paper Award in Wireless Communications; 2011 IEEE Wireless Communications Technical Committee Recognition Award; 2011 IEEE Communications Society Harold Sobol Award; 2010 Purdue University Outstanding Electrical and Computer Engineer Award; 2009 IEEE Marconi Prize Award in Wireless Communications; 2007 IEEE Communications Society *Joseph LoCicero* Publications Exemplary Award; and over 19 IEEE Best Paper Awards.

He has also been a dedicated teacher committed to excellence in teaching and scholarship. He received the *Mangoon Teaching Award* from Purdue University; Teaching Excellence Appreciation Award by the School of Engineering at HKUST (4 times); and the Michael G. Gale Medal for Distinguished Teaching (*Highest university-wide teaching award* and only one recipient/year is honored for his/her contributions).

He served as consultants for different organizations including Huawei, ASTRI, ZTE, Nortel, PricewaterhouseCoopers, and Motorola. He is the founding Editor-in-Chief of the prestigious *IEEE Transactions on Wireless Communications* and has served on the editorial board of other premier journals including the *IEEE Journal on Selected Areas in Communications – Wireless Series* (as Editor-in-Chief). He has also been involved in organizing many flagship international conferences.

From 1990 to 1993, he was a faculty member at the University of Melbourne, Australia. Since 1993, he has been with the Hong Kong University of Science & Technology (HKUST) where he is known as one of HKUST's most distinguished professors for his boundless energy, collegial nature, dedication, and excellence in research, education, and service. While at HKUST, he has held many administrative positions, including the Head of the Electronic and Computer Engineering department, Director of the Wireless IC Design Center, founding Director of Huawei Innovation Laboratory, and Director of the Hong Kong Telecom Institute of Information Technology.

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Dr. Letaief received the BS degree *with distinction* in Electrical Engineering from Purdue University at West Lafayette, Indiana, USA, in December 1984. He received the MS and Ph.D. Degrees in Electrical Engineering from Purdue University, in Aug. 1986, and May 1990, respectively.