

Richard T. B. Ma

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Research Interests	Data Analytics Systems and Cloud Computing Economics and Evolution of the Internet
Education	<div><div>Columbia University <i>Doctor of Philosophy</i>, Electrical Engineering <i>Master of Philosophy</i>, Electrical Engineering</div><div>New York May 2010 February 2008</div></div> <div><div>The Chinese University of Hong Kong <i>Master of Philosophy</i>, Computer Science and Engineering <i>Bachelor of Science (First Class Honors)</i>, Computer Science</div><div>Hong Kong August 2004 July 2002</div></div>
Experience	<div><div>Department of Computer Science <i>Associate Professor</i></div><div>National University of Singapore July 2021—now</div></div> <div><div>Department of Computer Science <i>Assistant Professor</i></div><div>National University of Singapore July 2014— June 2021</div></div> <div><div>Advanced Digital Science Center <i>Research Scientist</i></div><div>University of Illinois June 2010—June 2014</div></div> <div><div>Telefonica Research and Development <i>Visiting Research Fellow</i></div><div>Barcelona, Spain January 2010—April 2010</div></div> <div><div>IBM T. J. Watson Research Center <i>Research Intern</i></div><div>Hawthorne, NY, USA May 2006—August 2006</div></div>
Awards	<div><div>Best Paper Award Runners-up, ACM Mobihoc Conference</div><div>2020</div></div> <div><div>Teaching Excellence Award, School of Computing, NUS</div><div>2019</div></div> <div><div>Nominated for NUS Young Researcher Award by School of Computing</div><div>2018</div></div> <div><div>Best Paper Award Finalist, Invited Fast-Track Paper, IEEE INFOCOM</div><div>2017</div></div> <div><div>Bell Labs Best Paper, IEEE Workshop on Smart Data Pricing (SDP)</div><div>2015</div></div> <div><div>Best Paper, IEEE International Conference on Network Protocols (ICNP)</div><div>2014</div></div> <div><div>Best Paper, IEEE International Conference on Cloud Engineering (IC2E)</div><div>2013</div></div>
Invited Tutorial, Plenary and Keynote Talks	<div>Panelist and speaker of Distinguished Expert Panel, the 19th Asia-Pacific Network Operations and Management Symposium (APNOMS), Matsue, Japan, September 2019.</div> <div>Tutorial at the ACM SIGMETRICS Conference, Illinois, USA, June 2017.</div> <div>Keynote at the 6th international workshop on Big Data and Cloud Performance (DCPerf), Nara, Japan, June 27, 2016.</div> <div>Speech at the Huawei Future Network ADN Forum in Hong Kong, June 21, 2016.</div> <div>Keynote at the 1st Network Economics and Big Data Conference, Beijing, China, July 4, 2015.</div> <div>Invited talk at the 5th Workshop on Internet Economics, December 2014, USA.</div> <div>Invited talk at the Internet Topology & Economics workshop, Georgia, USA, November 2012.</div> <div>Invited talk at the 2nd Workshop on Internet Economics, December 2011, USA.</div>
Research Grants	Mun Choon Chan (PI), Ben Leong (Co-PI) and Richard T. B. Ma (Co-PI). Scalable and Resilient Network Services based on Data-Plane Programmability. <i>Ministry of Education (MoE), Academic Research Fund (AcRF) Tier 2, MOE2019-T2-2-134, S\$586,344, July 2020 - June 2023.</i>

Richard T. B. Ma (PI). **Towards Real-Time Machine Learning: A Stream System Approach.** *Ministry of Education (MoE), Academic Research Fund (AcRF) Tier 1, T1 251RES1911, R-252-000-B18-114, S\$221,000, February 2020 - February 2023.*

Richard T. B. Ma (PI). **Design and Implementation of Network-Assisted Stream Systems.** *Ministry of Education (MoE), Academic Research Fund (AcRF) Tier 1, T1 251RES1831, R-252-000-A67-114, S\$76,000, March 2019 - March 2022.*

Richard T. B. Ma (PI) and Dinil Divakaran (Co-PI). **Innovative Services with Software-Defined Networking.** *NUS-Singtel Corporate Lab Research Project, S\$760,270, January 2017 - June 2021.*

Richard T. B. Ma (PI) and Weijie Wu (Co-PI). **The Trends and Driving Force of Internet Ecosystem Evolution.** *Huawei Innovation Research Program (HIRP), R-252-000-596-597, S\$230,000, December 2015 - May 2017.*

Richard T. B. Ma (PI). **Towards Quality of Service for the Future Internet.** *Ministry of Education (MoE), Academic Research Fund (AcRF) Tier 1, T1 251RES1414, R-252-000-572-112, S\$112,500, March 2015 - March 2018.*

Marianne Winslett (PI), Richard T. B. Ma (Co-PI), Yin Yang (Co-PI) and Zhenjie Zhang (Co-PI). **RESA: Scalable, Real-time Analytics for Challenging Data.** *Advanced Digital Sciences Center (ADSC) Human Centric Cyber Systems (HCCS) Program Project, S\$1,613,000, January 2014 - December 2016.*

Richard T. B. Ma (PI). **Revealing the Internet Evolution: A Data-Driven and Model-Based Approach.** *Ministry of Education (MoE), Academic Research Fund (AcRF) Tier 1, T1 251RES1306, R-252-000-526-112, S\$39,150, July 2013 - June 2015.*

Richard T. B. Ma (PI). **Resource Provisioning and Optimization for Enterprise Cloud Users.** *Ministry of Education (MoE), Academic Research Fund (AcRF) Tier 1, R-252-000-448-133, S\$178,000, January 2011 - January 2014.*

David K. Y. Yau (PI) and Richard T. B. Ma (Co-PI). **On Supporting Quality of Services for VirtualX Applications.** *Advanced Digital Sciences Center (ADSC) Human Sixth Sense Program (HSSP) Project, S\$1,331,685, January 2011 - December 2014.*

David K. Y. Yau (PI) and Richard T. B. Ma (Co-PI). **Incentive Pricing for Aggregated User Load Scheduling and Control.** *Advanced Digital Sciences Center (ADSC) Human Sixth Sense Program (HSSP) Project, S\$1,807,764, January 2011 - December 2014.*

Conference Organizer

Posters/Demos Co-Chair, IEEE International Conference on Network Protocols (ICNP) 2021
Publicity Co-Chair, ACM SIGCOMM Conference 2020
Travel Grant Co-Chair, ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT) 2020
Area Chair, IEEE International Conference on Network Protocols (ICNP) 2019
Finance Chair, IEEE International Conference on Network Protocols (ICNP) 2016

Conference TPC Member

ACM SIGMETRICS Conference 2022, 2021, 2020, 2014, 2013
ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT) 2015, 2014, 2013, 2011
ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc) 2018, 2017, 2016
IEEE International Conference on Network Protocols (ICNP) 2021, 2020, 2019, 2018, 2017, 2016, 2015
IEEE International Conference on Distributed Computing Systems (ICDCS) 2012
IFIP Performance Conference 2021, 2014, 2011
IFIP Networking Conference 2012, 2011
IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS) 2017, 2015, 2013

IEEE/ACM International Symposium on Quality of Service (IWQoS) 2019, 2017, 2016
 IEEE International Conference on Distributed Computing and Networking (ICDCN) 2016
 IEEE International Conference on Cloud Engineering (IC2E) 2017
 ACM SIGCOMM Asian Internet Engineering Conference (AINTEC) 2017, 2015
 IEEE International Workshop on Smart Data Pricing (SDP) 2016, 2015, 2014
 IEEE Workshop on Pricing and Incentives in Networks (W-PIN) 2014, 2013, 2012
 IEEE International Teletraffic Congress (ITC) 2016, 2012
 Conference on the Economics of Grids, Clouds and Services (GECON) 2018, 2017, 2016, 2012–2014
 International Conference on COMmunication Systems & NETworkS (COMSNETS) 2019, 2018, 2015
 International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt) 2015
 The Workshop on the Economics of Networks, Systems and Computation (NetEcon) 2021, 2020, 2019, 2018, 2017, 2016
 The International Conference on Computer Communication and Networks (ICCCN) 2016

Book

Richard T. B. Ma. **Internet Economics and ISP Business Settlements: A Shapley Value Approach.** VDM Verlag Dr. Muller Publishing, 2010.

Journal Publications

Richard T. B. Ma. **Internet Transport Economics: Model and Analysis.** *IEEE/ACM Transactions on Networking*, Volume *xx*, Issue *x*, pp. *x-x*, 2021.

Lailong Luo, Deke Guo, Ori Rottenstreich, Richard T. B. Ma, Xueshan Luo and Bangbang Ren. **A Capacity-elastic Cuckoo Filter Design for Dynamic Set Representation.** *IEEE Transactions on Network and Service Management*, Volume *xx*, Issue *xx*, pp. *xx-xx*, 2021.

Saeid Montazeri Shahtouri, Mostafa Rezazad and Richard T. B. Ma **Frozen Cache: Mitigating Filter Effect and Redundancy for Network of Caches** *IEEE Access*, September 2021.

Lailong Luo, Deke Guo, Yawei Zhao, Ori Rottenstreich, Richard T. B. Ma, and Xueshan Luo. **MCFsyn: A Multi-party Set Reconciliation Protocol with the Marked Cuckoo Filter.** *IEEE Transactions on Parallel and Distributed Systems*, Volume *32*, Issue *11*, pp. 2705-2718, 2021.

Xin Wang, Yinlong Xu and Richard T. B. Ma. **Paid Peering, Settlement-Free Peering, or Both?** *IEEE/ACM Transactions on Networking*, Volume *29*, Issue *2*, pp. 585-594, 2021.

Xin Wang and Richard T. B. Ma. **On the Tussle between Over-the-Top and Internet Service Providers: Analysis of the Netflix-Comcast Type of Deals.** *IEEE/ACM Transactions on Networking*, Volume *28*, Issue *6*, pp. 2823 - 2835, 2020.

Lianjie Shi, Xin Wang and Richard T. B. Ma. **On Multi-Resource Procurement in Internet Access Markets: Optimal Strategies and Market Equilibrium.** *Performance Evaluation (Proceedings of the 38th International Symposium on Computer Performance, Modeling, Measurement and Evaluation (IFIP Performance), November 2-6, Milan, Italy, 2020.)*

Nilofar Bayat, Richard T. B. Ma, Vishal Misra and Dan Rubenstein. **Zero-Rating and Net Neutrality: Big Winners and Small Losers.** *Performance Evaluation (Proceedings of the 38th International Symposium on Computer Performance, Modeling, Measurement and Evaluation (IFIP Performance), November 2-6, Milan, Italy, 2020.)*

Hong Xie, Weijie Wu, Richard T. B. Ma and John C. S. Lui. **Pay as Your Service Needs: An Application-Driven Pricing Approach for the Internet Economics.** *ACM Transactions on Internet Technology*, Volume *19*, Issue *4*, November 2019.

Walid A. Y. Aljoby, Xin Wang, Tom Z. J. Fu and Richard T. B. Ma. **On SDN-Enabled Online and Dynamic Bandwidth Allocation for Stream Analytics.** *IEEE Journal on Selected Areas in Communications*, Volume 37, Issue: 8, pp. 1688 - 1702, August 2019.

Jing Tang and Richard T. B. Ma. **Regulating Monopolistic ISPs without Neutrality.** *IEEE Journal on Selected Areas in Communications*, Volume 37, Issue: 7, pp. 1666 - 1680, July 2019.

Lailong Luo, Deke Guo, Ori Rottenstreich, Xueshan Luo, Richard T. B. Ma and Ying-Dar Lin. **Optimizing Bloom Filter: Challenges, Solutions, and Comparisons.** *IEEE Communications Surveys and Tutorials*, Volume 21, Issue: 2, pp. 1912-1949, 2019.

Mao Zou, Richard T. B. Ma, Xin Wang and Yinlong Xu. **On Optimal Service Differentiation in Congested Network Markets.** *IEEE/ACM Transactions on Networking*, Volume 26, Issue 6, pp. 2693 - 2706, December 2018.

Li Ye, Weijie Wu, Richard T. B. Ma and John C. S. Lui. **On the Profitability of Bundling Sale Strategy for Online Service Markets with Network Effects.** *ACM Transactions on Internet Technology*, Volume 19, Issue 3, May 2019.

Mao Zou, Richard T. B. Ma and Yinlong Xu. **Towards an Efficient Market Mediator for Divisible Resources.** *Performance Evaluation 127-128*, pp. 212-234, November 2018. (*Proceedings of IFIP Performance Conference*, December 5-7, Toulouse, France, 2018.)

Lianjie Shi, Xin Wang, Richard T. B. Ma and Y. C. Tay. **Weighted Fair Caching: Occupancy-Centric Allocation for Space-Shared Resources.** *Performance Evaluation 127-128*, pp. 194-211, November 2018. (*Proceedings of IFIP Performance Conference*, December 5-7, Toulouse, France, 2018.)

Hong Xie, Richard T. B. Ma and John C. S. Lui. **Enhancing Reputation via Price Discount in E-Commerce Systems: A Data Driven Approach.** *ACM Transactions on Knowledge Discovery from Data*, Volume 12, Issue 3, April 2018 .

Xin Wang, Richard T. B. Ma and Yinlong Xu. **The Role of Data Cap in Optimal Two-Part Network Pricing.** *IEEE/ACM Transactions on Networking*, Volume 25, Issue 6, pp. 3602 - 3615, December 2017.

Tom Z. J. Fu, Jianbing Ding, Richard T. B. Ma, Marianne Winslett, Yin Yang and Zhenjie Zhang. **DRS: Auto-Scaling for Real-Time Stream Analytics.** *IEEE/ACM Transactions on Networking*, Volume 25, Issue 6, pp. 3338 - 3352, December 2017.

Mingshen Sun, Xiaolei Li, John C. S. Lui, Richard T. B. Ma and Zhenkai Liang. **Monet: A User-oriented Behavior-based Malware Variants Detection System for Android.** *IEEE Transactions on Information Forensics and Security*, Volume 12, Issue 5, pp. 1103 - 1112, May 2017.

Richard T. B. Ma. **Pay or Perish: The Economics of Premium Peering.** *IEEE Journal on Selected Areas in Communications*, Volume 35, Issue: 2, pp. 353 - 366, February 2017.

Richard T. B. Ma, Jingjing Wang and Dah Ming Chiu. **Paid Prioritization and Its Impact on Net Neutrality.** *IEEE Journal on Selected Areas in Communications*, Volume 35, Issue: 2, pp. 367 - 379, February 2017.

Yipeng Zhou, Liang Chen, Mi Jing, Shenglong Zou and Richard T. B. Ma. **Design, Implementation, and Measurement of a Crowdsourcing-Based Content Distribution Platform.** *ACM Transactions on Multimedia Computing, Communications, and Applications*, Volume 12, Issue 5s, November 2016.

Richard T. B. Ma. **Usage-Based Pricing and Competition in Congestible Network Service Markets.** *IEEE/ACM Transactions on Networking*, Volume 24, Issue 5, pp. 3084 - 3097, October 2016.

Richard T. B. Ma. **Subsidization Competition: Vitalizing the Neutral Internet.**

IEEE/ACM Transactions on Networking, Volume 24, Issue 4, pp. 2563 - 2576, August 2016.

Xin Wang, Richard T. B. Ma and Yinlong Xu. **The Role of Data Cap in Two-part Pricing under Market Competition.** *IEEE Network*, Volume 30, Issue 2, pp. 12-17, March-April 2016.

Jianbing Ding, Richard T. B. Ma, Yin Yang and Zhenjie Zhang. **Auction-Based Cloud Service Differentiation with Service Level Objectives.** *Computer Networks*, Volume 94, pp. 231 - 249, January 2016.

Mohammad R. Vedady Moghadam, Rui Zhang and Richard T. B. Ma. **Distributed Frequency Control via Randomized Response of Electric Vehicles in Power Grid.** *IEEE Transactions on Sustainable Energy*, 7(1), pp. 312 - 324, January 2016.

Richard T. B. Ma, John C. S. Lui and Vishal Misra. **Evolution of the Internet Economic Ecosystem.** *IEEE/ACM Transactions on Networking*, Volume 23, Issue 1, pp. 85 - 98, February 2015.

Mohammad R. Vedady Moghadam, Richard T. B. Ma and Rui Zhang. **Distributed Frequency Control in Smart Grids via Randomized Demand Response.** *IEEE Transactions on Smart Grid*, 5(6), pp. 2798 - 2809, November 2014.

Weijie Wu, Richard T. B. Ma and John C. S. Lui. **Distributed Caching via Rewarding: An Incentive Scheme Design in P2P-VoD Systems.** *IEEE Transactions on Parallel and Distributed Systems*, 25(3), pp 612 - 621, March 2014.

William G. Temple and Richard T. B. Ma. **Monotonic Marginal Pricing: Demand Response with Price Certainty.** *Performance Evaluation Review*, 41(3), pp. 65-70, December 2013.

Yudong Yang, Richard T. B. Ma and John C. S. Lui. **Price Differentiation and Control in the Kelly Mechanism.** *Performance Evaluation* 70(10), pp. 792-805, October 2013. (*Proceedings of IFIP Performance Conference*, September 24-26, Vienna, Austria, 2013.)

Richard T. B. Ma and Vishal Misra. **The Public Option: A Non-Regulatory Alternative to Network Neutrality.** *IEEE/ACM Transactions on Networking*, 21(6), pp. 1866 - 1879, December 2013.

Weijie Wu, John C. S. Lui and Richard T. B. Ma. **On Incentivizing Upload Capacity in P2P-VoD Systems: Design, Analysis and Evaluation.** *Computer Networks*, 57(7), pp. 1674 - 1688, May 2013.

Richard T. B. Ma and Vishal Misra. **Congestion and Its Role in Network Equilibrium.** *IEEE Journal on Selected Areas in Communications*, 30(11), pp. 2180 - 2189, December 2012.

Richard T. B. Ma, Dah Ming Chiu, John C. S. Lui, Vishal Misra and Dan Rubenstein. **Price Differentiation in the Kelly Mechanism.** *Performance Evaluation Review*, 40(2), pp. 30-33, September 2012.

Richard T. B. Ma, Dah Ming Chiu, John C. S. Lui, Vishal Misra and Dan Rubenstein. **On Cooperative Settlement Between Content, Transit and Eyeball Internet Service Providers.** *IEEE/ACM Transactions on Networking*, 19(3), pp. 802 - 815, June 2011.

Richard T. B. Ma, Dah Ming Chiu, John C. S. Lui, Vishal Misra and Dan Rubenstein. **Internet Economics: The Use of Shapley Value for ISP settlement.** *IEEE/ACM Transactions on Networking*, 18(3), pp. 775 - 787, June 2010.

Richard T. B. Ma, Vishal Misra and Dan Rubenstein. **An Analysis of Generalized Slotted-Aloha Protocols.** *IEEE/ACM Transactions on Networking*, 17(3), pp. 936 - 949, June 2009.

Richard T. B. Ma, Sam C. M. Lee, John C. S. Lui and David K. Y. Yau. **Incentive and Service Differentiation in P2P Networks: A Game Theoretic Approach.** *IEEE/ACM Transactions on Networking*, 14(5), pp. 978 - 991, October 2006.

Richard T. B. Ma, Vishal Misra and Dan Rubenstein. **Cooperative and Non-cooperative Models for slotted-Aloha type MAC protocols.** *Performance Evaluation Review*, 33(3), pp. 30-32, December 2005.

Richard T. B. Ma, Sam C. M. Lee, John C. S. Lui and David K. Y. Yau. **Incentive P2P Networks: A Protocol to Encourage Information Sharing and Contribution.** *Performance Evaluation Review*, 31(2), pp. 23-25, September 2003.

Conference Publications

Xin Wang and Richard T. B. Ma. **On Private Peering Agreements between Content and Access Providers: A Contractual Equilibrium Analysis.** *Proceedings of the ACM SIGMETRICS Conference, Beijing, China, 2021.*

Walid Aljoby, Xin Wang, Dinil Mon Divakaran, Tom Z. J. Fu and Richard T. B. Ma. **DiffPerf: An In-Network Performance Optimization for Improving User-Perceived QoE.** *Proceedings of the IEEE 7th International Conference on Network Softwarization (NetSoft) 2021.*

Shuhao Zhang, Yancan Mao, Jiong He, Philipp M. Grulich, Steffen Zeuch, Bingsheng He, Richard T. B. Ma and Volker Markl. **Parallelizing Intra-Window Join on Multicores: An Experimental Study.** *Proceedings of the ACM SIGMOD Conference, 2021.*

Lianjie Shi, Xin Wang and Richard T. B. Ma. **On Multi-Resource Procurement in Internet Access Markets: Optimal Strategies and Market Equilibrium.** *Proceedings of the 38th International Symposium on Computer Performance, Modeling, Measurement and Evaluation (IFIP Performance), November 2-6, Milan, Italy, 2020.*

Niloofar Bayat, Richard T. B. Ma, Vishal Misra and Dan Rubenstein. **Zero-Rating and Net Neutrality: Big Winners and Small Losers.** *Proceedings of the 38th International Symposium on Computer Performance, Modeling, Measurement and Evaluation (IFIP Performance), November 2-6, Milan, Italy, 2020.*

Richard T. B. Ma. **Internet Transport Economics: Model and Analysis.** *Proceedings of the ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc), October 11-14, 2020.*

Yifan Hou, Jian Zhang, James Cheng, Kaili Ma, Richard T. B. Ma, Hongzhi Chen and Ming-Chang Yang. **Measuring and Improving the Use of Graph Information in Graph Neural Networks.** *Proceedings of the 8th International Conference on Learning Representations (ICLR), April 26 - 30, Addis Ababa, Ethiopia, 2020.*

Li Wang, Tom Z. J. Fu, Richard T. B. Ma, Marianne Winslett and Zhenjie Zhang. **Elasticutor: Rapid Elasticity for Realtime Stateful Stream Processing.** *Proceedings of the ACM SIGMOD conference, June 30 - July 5, Amsterdam, The Netherlands, 2019.*

Lianjie Shi, Xin Wang and Richard T. B. Ma. **On Optimal Hybrid Premium Peering and Caching Purchasing Strategy of Internet Content Providers.** *Proceedings of the IEEE International Conference on Computer Communications (INFOCOM), April 29 - May 2, Paris, France, 2019.*

Lailong Luo, Deke Guo, Ori Rottenstreich, Xueshan Luo, Richard T. B. Ma and Bangbang Ren. **The Consistent Cuckoo Filter.** *Proceedings of the IEEE International Conference on Computer Communications (INFOCOM), April 29 - May 2, Paris, France, 2019.*

Mao Zou, Richard T. B. Ma and Yinlong Xu. **Towards an Efficient Market Mediator for Divisible Resources.** *Proceedings of the 36th International Symposium on Computer Performance, Modeling, Measurement and Evaluation (IFIP Performance), December 5-7, Toulouse, France, 2018.*

Lianjie Shi, Xin Wang, Richard T. B. Ma and Y. C. Tay. **Weighted Fair Caching: Occupancy-Centric Allocation for Space-Shared Resources.** *Proceedings of the 36th International Symposium on Computer Performance, Modeling, Measurement and Evaluation (IFIP Performance), December 5-7, Toulouse, France, 2018.*

Walid A. Y. Aljoby, Xin Wang, Tom Z. J. Fu and Richard T. B. Ma. **On SDN-Enabled On-**

line and Dynamic Bandwidth Allocation for Stream Analytics. *Proceedings of the 26th IEEE International Conference on Network Protocols (ICNP)*, September 24-27, Cambridge, UK, 2018.

Xin Wang, Yinlong Xu and Richard T. B. Ma. **Paid Peering, Settlement-Free Peering, or Both?** *Proceedings of the IEEE International Conference on Computer Communications (INFOCOM)*, April 15 - 19, Honolulu, HI, USA, 2018.

Pravein G. Kannan, Mun Choon Chan, Richard T. B. Ma and Ee-Chien Chang. **Raptor: Scalable Rule Placement over Multiple Path in Software Defined Networks.** *Proceedings of the IFIP Networking Conference*, Stockholm, Sweden, June 12-16, 2017.

Xin Wang, Richard T. B. Ma and Yinlong Xu. **On Optimal Two-Sided Pricing of Congested Networks.** *Proceedings of the ACM Sigmetrics Conference*, Champaign-Urbana, USA, June 5-9, 2017.

Mao Zou, Richard T. B. Ma, Xin Wang and Yinlong Xu. **On Optimal Service Differentiation in Congested Network Markets.** *Proceedings of the IEEE International Conference on Computer Communications (INFOCOM)*, May 1 - 4, Atlanta, GA, USA, 2017.

Richard T. B. Ma. **Efficient Resource Allocation and Consolidation with Selfish Agents: An Adaptive Auction Approach.** *Proceedings of the 36th International Conference on Distributed Computing Systems (ICDCS)*, Nara, Japan, June 27th - 30th, 2016.

Richard T. B. Ma and Don Towsley. **Cashing in on Caching: On-demand Contract Design with Linear Pricing.** *Proceedings of ACM Conference on emerging Networking EXperiments and Technologies (CoNEXT)*, Heidelberg, Germany, December, 2015.

Tom Z. J. Fu, Jianbing Ding, Richard T. B. Ma, Marianne Winslett, Yin Yang and Zhenjie Zhang. **DRS: Dynamic Resource Scheduling for Real-Time Analytics over Fast Streams.** *Proceedings of the 35th International Conference on Distributed Computing Systems (ICDCS)*, Columbus, Ohio, USA, June 29th - July 2nd, 2015.

Xin Wang, Richard T. B. Ma and Yinlong Xu. **The Role of Data Cap in Optimal Two-part Network Pricing.** *Proceedings of the 24th International World Wide Web Conference (WWW)*, Florence, Italy, May 18-22, 2015.

Xin Wang, Richard T. B. Ma, Yinlong Xu and Zhipeng Li. **Sampling Online Social Networks via Heterogeneous Statistics.** *Proceedings of the IEEE International Conference on Computer Communications (INFOCOM)*, April 26 - May 1, Hong Kong, China, 2015.

Richard T. B. Ma. **Subsidization Competition: Vitalizing the Neutral Internet.** *Proceedings of ACM Conference on emerging Networking EXperiments and Technologies (CoNEXT)*, Sydney, Australia, December, 2014.

Richard T. B. Ma. **Pay-As-You-Go Pricing and Competition in Congested Network Service Markets.** *Proceedings of the IEEE International Conference on Network Protocols (ICNP)*, October 21-24, Raleigh, NC, USA, 2014.

Jing Tang and Richard T. B. Ma. **Regulating Monopolistic ISPs without Neutrality.** *Proceedings of the IEEE International Conference on Network Protocols (ICNP)*, October 21-24, Raleigh, NC, USA, 2014. Best Paper Award. (Acceptance rate: 32 out of 160)

Jingjing Wang, Richard T. B. Ma and Dah Ming Chiu. **Paid Prioritization and Its Impact on Net Neutrality** *Proceedings of the IFIP Networking Conference*, June 2-4, Trondheim, Norway, 2014.

Weijie Wu, Richard T. B. Ma and John C. S. Lui. **Exploring Bundling Sale Strategy in Online Service Markets with Network Effects.** *Proceedings of the IEEE International Conference on Computer Communications (INFOCOM)*, April 27- May 2, Toronto, Canada, 2014.

Yudong Yang, Richard T. B. Ma and John C. S. Lui. **Price Differentiation and Control**

in the Kelly Mechanism. *Proceedings of the 31st International Symposium on Computer Performance, Modeling, Measurement and Evaluation (IFIP Performance)*, September 24-26, Vienna, Austria, 2013.

Richard T. B. Ma, John C. S. Lui and Vishal Misra. **On the Evolution of the Internet Economic Ecosystem.** *Proceedings of the 22nd International World Wide Web Conference (WWW)*, pp. 849-860, Rio de Janeiro, Brazil, May 13-17, 2013.

Zhenjie Zhang, Richard T. B. Ma, Jianbing Ding and Yin Yang. **ABACUS: An Auction-Based Approach to Cloud Service Differentiation.** *Proceedings of IEEE International Conference on Cloud Engineering (IC2E)*, pp. 292-301, San Francisco, California, USA, March 25-28, 2013. Best Paper Award. (Acceptance rate: 22 out of 107)

Richard T. B. Ma and Vishal Misra. **The Public Option: A Non-Regulatory Alternative to Network Neutrality.** *Proceedings of ACM Conference on emerging Networking EXperiments and Technologies (CoNEXT)*, Tokyo, Japan, December, 2011.

Richard T. B. Ma, Dah Ming Chiu, John C. S. Lui, Vishal Misra and Dan Rubenstein. **On Cooperative Settlement Between Content, Transit and Eyeball Internet Service Providers.** *Proceedings of ACM Conference on emerging Networking EXperiments and Technologies (CoNEXT)*, Madrid, Spain, December, 2008.

Richard T. B. Ma, Dah Ming Chiu, John C. S. Lui, Vishal Misra and Dan Rubenstein. **Internet Economics: The Use of Shapley Value for ISP Settlement.** *Proceedings of ACM Conference on emerging Networking EXperiments and Technologies (CoNEXT)*, New York, USA, December, 2007.

Richard T. B. Ma, Vishal Misra and Dan Rubenstein. **Modeling and Analysis of Generalized Slotted-Aloha MAC Protocols in Cooperative, Competitive and Adversarial Environments.** *The 26th International Conference on Distributed Computing Systems (ICDCS)*, Lisbon, Portugal, July 4-7, 2006.

Richard T. B. Ma, Sam C. M. Lee, John C. S. Lui and David K. Y. Yau. **A Game Theoretic Approach to Provide Incentive and Service Differentiation in P2P Networks.** *The ACM Sigmetrics/Performance*, June, 2004.

Richard T. B. Ma, Sam C. M. Lee, John C. S. Lui and David K. Y. Yau. **An Incentive Mechanism for P2P Networks.** *The 24th International Conference on Distributed Computing Systems (ICDCS)*, Tokyo, Japan, March, 2004.

Workshop and Poster Papers

Rengan Dou, Xin Wang and Richard T. B. Ma. **Towards Application Performance Fairness on Clouds.** *Proceedings of the 11th ACM SIGOPS Asia-Pacific Workshop on Systems (APSys)*, 2020.

Lailong Luo, Deke Guo, Ori Rottenstreich, Richard T. B. Ma and Xueshan Luo. **Set Reconciliation with Cuckoo Filters.** *Proceedings of the 28th ACM International Conference on Information and Knowledge Management (CIKM)*, pp. 2465 – 2468, 2019.

Walid A. Y. Aljoby, Tom Z. J. Fu and Richard T. B. Ma. **Impacts of Task Placement and Bandwidth Allocation on Stream Analytics.** *Proceedings of the IEEE ICNP Conference (Workshop)*, 2017.

Victor C. Liang, Richard T. B. Ma, Wee Siong Ng, Li Wang, Marianne Winslett, Huayu Wu, Shanshan Ying and Zhenjie Zhang. **Mercury: Metro Density Prediction with Recurrent Neural Network on Streaming CDR Data.** *Proceedings of the IEEE ICDE Conference*, pp. 1374-1377 (Demo), May, 2016.

Hong Xie, and Richard T. B. Ma and John C. S. Lui. **Trading Discount for Reputation?: On the Design and Analysis of E-Commerce Discount Mechanisms.** *Proceedings of the ACM SIGMETRICS Conference (Poster)*, June, 2016.

Tom Z. J. Fu, Jianbing Ding, Richard T. B. Ma, Marianne Winslett, Yin Yang, Zhenjie Zhang, Yong Pei, Bingbing Ni. **LiveTraj: Real-Time Trajectory Tracking over Live Video Streams.** *Proceedings of the ACM Multimedia Conference*, pp. 777-780 (Video), October,

2015.

Mansheng Yang and Richard T. B. Ma. **Smooth Task Migration in Apache Storm.** *Proceedings of the ACM SIGMOD Conference (Poster)*, 2014.

Xin Wang, Richard T. B. Ma and Yinlong Xu. **The Role of Data Cap in Two-part Pricing under Market Competition** *Proceedings of the 4th Workshop on Smart Data Pricing (SDP), Hong Kong, China, April 27, 2015.*

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Richard T. B. Ma, Vishal Misra and Dan Rubenstein. **Cooperative and Non-cooperative Models for slotted-Aloha type MAC protocols.** *In Proceedings of The Seventh Workshop on Mathematical performance Modeling and Analysis, Banff, AB, Canada, June 6, 2005.*

Richard T. B. Ma, Sam C. M. Lee, John C. S. Lui and David K. Y. Yau. **Incentive P2P Networks: A Protocol to Encourage Information Sharing and Contribution.** *In Proceedings of The Fifth Workshop on Mathematical performance Modeling and Analysis, Marina del Rey, CA, USA, June, 2003.*

Invited Talks

The Public Option: A Non-regulatory Alternative to Network Neutrality. *The 2nd Workshop on Internet Economics (WIE'11), December 1-2, University of California, San Diego, 2011.*

The Public Option Approach to Network Neutrality. *iDA Singapore, April 13, 2012.*

A Macroscopic Model of the Internet Economic Ecosystem. *Workshop Internet Topology and Economics, Georgia Institutue of Technology, November 13, 2012.*

The Public Option alternative for the Network Neutrality debate (presented by collaborator Vishal Misra) *The US Federal Communications Committee, Washinting DC, USA, October22, 2012.*

Invited Participation and Disucssion. *Workshop on Sustaining Digital Infrastructure, World Economic Forum, June 17, 2013.*