

TEERAWAT ISSARIYAKUL, Ph.D.
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CURRENT AFFILIATION

- | | |
|--|-----------------|
| • TOT Public Company Limited, Bangkok, Thailand | Engineer |
| • Asian Institute of Technology, Patumtani, Thailand | Adjunct Faculty |

ACADEMIC RECORD

University of Manitoba, Winnipeg, MB, Canada

Ph.D. in Electrical and Computer Engineering **2001-2005**

Dissertation: "Scheduling and Error Control in Cellular and Multi-hop Wireless Networks: Analysis and Optimization"

Advisor: Dr. Ekram Hossain

External Examiner: Dr. Victor C. M. Leung

Major: Wireless Networking

Asian Institute of Technology, Pathumthani, Thailand

M.Eng. in Telecommunications **1997-1999**

Thesis: "Individual Location Area Management for Cellular Mobile Networks"

Advisor: Mr. Tapio Erke

Thammasat University, Pathumthani, Thailand

B.Eng. in Electrical Engineering **1993-1997**

AWARDS

- | | |
|---|------------------|
| • Telecommunications Research Laboratories Research (TRLabs) Graduate Scholarship | 2001-2005 |
| • University of Manitoba Graduate Fellowship (UMGF) | 2003-2005 |
| • Full scholarship sponsored by Telephone Organization of Thailand | 1997-1999 |

AREAS OF EXPERTISE

- Markov-based modeling and Analysis; Markov Decision Process
- Protocol optimization
- Cross-layer analysis in cognitive radio networks
- Scheduling algorithms in centralized wireless networks such as cellular wireless networks
- Medium access control protocols in single-hop and multi-hop distributed wireless networks such as IEEE 802.11
- Model Analysis using stochastic domination and supermodularity properties

MAJOR CONTRIBUTIONS

- Designing an optimization-based fair scheduling algorithm in a cellular mobile network
 - Modeling channel-access delay distribution for a channel-quality-based opportunistic scheduling
 - Modeling distribution of end-to-end latency and number of link-layer transmissions of N packets for different levels of end-to-end reliability
 - Modeling and analyzing system performance of a cooperative diversity wireless network
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EXPERIENCES

ACADEMIC EXPERIENCES

Asian Institute of Technology (AIT), Thailand

Adjunct Faculty

2007 – Present

- Research Areas: Cognitive Radio, Intelligent Transportation System
- Course offered (Graduate Level): Network Simulation and Modeling Using NS2 (Network Simulator 2)

The University of Manitoba, Winnipeg, MB, Canada

Postdoctoral Fellows with the following research areas

2008

- Cognitive Radios
- Intelligent Transportation Systems

The University of British Columbia, Vancouver, BC, Canada

Postdoctoral Fellows with the following research areas

2005 – 2006

- Stochastic Domination
- Supermodularity
- Markov Decision Process
- Cooperative Diversity Networks
- Cognitive Radio
- Wireless Sensor Networks

TRLabs, Winnipeg, MB, Canada

Researcher with the following research areas

2001-2005

- Scheduling algorithms for wireless networks
- Inter-layer interactions in wireless networks
- Medium access control protocols (e.g., IEEE 802.11) for Mobile Ad hoc NETWORKS (MANET)
- End-to-end performance modeling and analysis in multi-hop wireless networks (including TCP)

The University of Manitoba, Winnipeg, MB, Canada

A Lecturer (Substitute)

2004

- Lecture third year students in a "Telecommunication Network"

NON-ACADEMIC EXPERIENCES

TOT Public Company Limited (Telephone Organization of Thailand), Bangkok, Thailand

System Engineer

2006 – Present

- Develop yearly business plans for TOT ISP
- Planning, installing, and operating communication networks in Suvarnabhumi airport, Bangkok, Thailand.

Ipsos Corporation, Winnipeg, MB, Canada

Translator

2005 – 2006

- Translate Thai-English scripts

Telephone Organization of Thailand, Bangkok, Thailand

System Engineer

2000 – 2001

- Initiate and operate Remote Access Server (RAS) pilot project, Asymmetric Digital Subscriber Line (ADSL) pilot project and Asynchronous Transfer Mode (ATM) pilot project
 - A trainer for RAS, ADSL, and ATM equipment and networks
 - A service fee committee member, which determines the service fee for RAS, ADSL, and ATM services
-

PUBLICATIONS AND TALKS

BOOKS

- T. Issariyakul and E. Hossain, Introduction to network simulator NS2," *Springer*, expected release date Nov. 2008.

JOURNAL PUBLICATIONS

- T. Issariyakul, L. S. Pillutla, and V. Krishnamurthy, "Performance of TCP in Cognitive Radio Networks under Dynamic Spectrum Allocation," to appear in *IEEE Communications Magazine* (13-page manuscript).
- T. Issariyakul and V. Krishnamurthy, "Amplify-and-forward cooperative diversity wireless networks: Cross-layer model, analysis, and monotonicity properties," to appear *IEEE/ACM Transactions on Networking* (14-page manuscript) Feb. 2009.
- T. Issariyakul and E. Hossain, "Performance modeling and analysis of a class of ARQ protocols in multi-hop wireless networks," to appear in *IEEE Transactions on Wireless Communications*.
- T. Issariyakul, E. Hossain, and A. S. Alfa, "End-to-end batch transmission in a multi-hop and multirate wireless network: Latency, reliability, and throughput analysis," to appear in *IEEE Transactions on Mobile Computing*, vol. 5, no. 9, Sept. 2006.
- T. Issariyakul and E. Hossain, "Channel-quality-based opportunistic scheduling with ARQ in multi-rate wireless networks: Modeling and analysis," *IEEE Transactions on Wireless Communications*, vol. 4, no. 4, pp. 796-806, Apr. 2006.
- T. Issariyakul and E. Hossain, "ORCA-MRT: An optimization-based approach for fair scheduling in multirate TDMA wireless networks," *IEEE Transactions on Wireless Communications*, vol. 4, no. 6, pp. 2823-2835, Nov. 2005.
- E. Hossain and T. Issariyakul, "Performance bound of dynamic forward link adaptation in cellular WCDMA networks using high-order modulation and multicode formats," *IEE Electronics Letters*, vol. 40, no. 2, pp. 132-133, Jan. 2004.
- T. Issariyakul, E. Hossain, and D. I. Kim, "Medium access control protocols for wireless mobile ad hoc networks: Issues and approaches," *Wiley Interscience Wireless Communications and Mobile Computing (WCMC)*, vol. 3, no. 8, Dec. 2003.

CONFERENCE PUBLICATIONS

- T. Issariyakul, D. Niyato, E. Hossain, and V. Krishnamurthy, "Packet-Level Performance Statistics in a Wireless Network Using Amplify-and-Forward Cooperative Diversity," in proc. of *IEEE International Conference on Communications 2006 (ICC'06)*, June 2005, Istanbul, Turkey.
 - T. Issariyakul, D. Niyato, E. Hossain, and A. S. Alfa, "Exact Distribution of Access Delay in IEEE 802.11 DCF MAC," in proc. of *IEEE Global Telecommunications Conference (Globecom'05)*, Nov. 2005, St. Louis, MO.
 - T. Issariyakul, E. Hossain, and A. S. Alfa, "Markov-based analysis of end-to-end batch transmission in a multi-hop wireless networks," in proc. of *IEEE International Conference on Communications 2005 (ICC'05)*, May 2005, Seoul, Korea.
 - T. Issariyakul, E. Hossain, and A. S. Alfa, "Analysis of latency for reliable end-to-end batch transmission in multi-rate multi-hop wireless networks," in proc. of *IEEE International Conference on Communications 2005 (ICC'05)*, May 2005, Seoul, Korea.
 - T. Issariyakul and E. Hossain, "Analysis of end-to-end performance in a multi-hop wireless network for different hop-level ARQ," in proc. of *IEEE Global Telecommunications Conference 2004 (Globecom'04)*, Nov. 2004, Dallas, TX.
 - T. Issariyakul and E. Hossain, "Throughput and temporal fairness optimization in a multirate TDMA wireless network," in proc. of *IEEE International Conference on Communications 2004 (ICC'04)*, Jun. 2004, Paris, France.
-

CONFERENCE PUBLICATIONS (CONT.)

- T. Issariyakul and E. Hossain, "Optimal radio channel allocation for fair queuing in wireless data networks," in proc. of *IEEE International Conference on Communications 2003 (ICC'03)*, May 2003, Anchorage, AK.
- T. Issariyakul and E. Hossain, "Designing wireless fair queuing MAC protocols using optimization techniques," in proc. of *IEEE International Symposium on Advances in Wireless Communications 2002 (ISWC'02)*, Sept. 2002, Victoria, BC, Canada.
- T. Issariyakul and T. Erke, "Individual location area management for cellular mobile networks," in proc. of *the 3rd International Symposium on Wireless Personal Multimedia Communications 2000 (WPMC'00)*, pp.115-119, Nov. 2000, Bangkok, Thailand.

PANEL SESSION COMMITTEE

- "Consideration of APT Researcher Forum," Panelist, *Asia Pacific Telecommunications and ICT Development Forum (ADF)*, Nov. 11-13, 2009, Bangkok, Thailand.

INVITED TALK

- "Cognitive Radio and Adaptive Frequency Selection Techniques for Wireless Local Area Networks," Invited Talk, *Asia Pacific Telecommunications and ICT Development Forum (ADF)*, Nov. 11-13, 2009, Bangkok, Thailand.
- "The Impact of Cognitive Radio on TCP Performance: Boon or Bane?," Invited Talk, *IEEE Communications Society Seminar*, Apr. 11, 2008, Winnipeg, MB, Canada.
- "A New Insight from an Analysis of TCP Performance over Dynamic Spectrum Access in a Cognitive Radio Network," Invited Talk, Apr. 3, 2008, National Institute of Information and Communications Technology (NICT), Yokosuka Research Park, Japan.
- "Is Cognitive Radio Always Beneficial for TCP Flows?," Invited Talk, Apr. 2, 2008, National Institute of Informatics (NII), The Graduate University for Advanced Studies Sokendai, Tokyo, Japan.
- "Tuning Dynamic Spectrum Access in a Cognitive Radio Network for TCP: Greed Isn't Good," Invited Talk, Mar. 28, 2008, Tohoku University, Sendai, Japan.
- "Packet-Level Performance Statistics in a Wireless Network Using Amplify-and-Forward Cooperative Diversity," Invited Talk, *IEEE Communications Society Seminar*, Feb. 16, 2006, The Hong Kong University of Science and Technology, Kowloon, Hong Kong.
- "Exact Distribution of Access Delay in IEEE 802.11 DCF MAC," Invited Talk, Aug. 18, 2005, *University of California at San Diego, La Jolla, CA*.
- "Latency-reliability tradeoff for different hop-level ARQ-based error recovery in a multi-hop wireless network," *TRLabs Smartboard Presentation*, Dec. 9, 2004, Winnipeg, MB, Canada.
- "Impact of radio link level multirate transmission on reliable end-to-end packet delivery in a multi-hop wireless network," Invited Talk, *IEEE Communications Society Seminar*, Nov. 27, 2004, Winnipeg, MB, Canada.

OTHER PRESENTATIONS

- "Latency-reliability tradeoff for different hop-level ARQ-based error recovery in a multi-hop wireless network," *TRLabs Smartboard Presentation*, Dec. 9, 2004, Winnipeg, MB, Canada.
 - "Impact of radio link level multirate transmission on reliable end-to-end packet delivery in a multi-hop wireless network," Invited Talk, *IEEE Communications Society Seminar*, Nov. 27, 2004, Winnipeg, MB, Canada.
 - "Performance modeling and analysis of a class of ARQ protocols in multihop wireless networks," *TRLabs Smartboard Presentation*, Feb. 2004, Winnipeg, MB, Canada.
 - "ORCA-MRT: An optimization-based approach for fair scheduling in multirate TDMA wireless networks," in *GRADCON'03*, Oct. 2003, Winnipeg, MB, Canada.
 - "Throughput and temporal fairness optimization in a multirate TDMA wireless network," in *TRLabs Tech Forum'03*, Oct. 2003, Edmonton, AB, Canada.
-

OTHER PRESENTATIONS (CONT.)

- "Optimal radio channel allocation for fair queuing in wireless data networks," in *GRADCON'02*, Oct. 2002, Winnipeg, MB, Canada.
 - "Optimal radio channel allocation (ORCA) for fair queuing in centralized wireless data networks," in *TRLabs Tech Forum'02*, Oct. 2002, Calgary, AB, Canada.
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RESEARCH GRANT

2007-2008

Grant: Asian pacific Telecommunity HRD Programme for Exchange of ICT Researchers and Engineers

Role: Principle Investigator

Amount: USD 22,800

Title: Cognitive Radio and Adaptive Frequency Selection Techniques for Wireless Local Area Networks

2008-2009

Grant: Asian pacific Telecommunity HRD Programme for Exchange of ICT Researchers and Engineers

Role: Principle Investigator

Amount: USD 42,300

Title: Improving Quality of Internet Usage and Quality of Information in an Intelligent Transportation System

VOLUNTEERS

TECHNICAL PROGRAM COMMITTEE

- Canadian Conference on Electrical and Computer Engineering (CCECE) – 09, 08
- The 5th International Wireless Communications and Mobile Computing Conference 2009 (IWCMC'09)
- The annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications 2008 (PIMRC'08)
- The IEEE Wireless Communications & Networking Conference 2008 (WCNC'08)
- The Fifth International ICST Conference on Heterogeneous Networking for Quality, Reliability, Security and Robustness (QShine 2008)
- The International Conference on Mobile Technology, Applications and Systems (IEE Mobility'06)

SESSION CHAIR OF ACADEMIC CONFERENCES

- The IEEE International Conference on Communications 2006 (ICC'06)

REVIEWER OF ACADEMIC JOURNALS

- IEEE Communications Magazine
- IEEE Transactions on Wireless Communications
- IEEE Transactions on Vehicular Technology
- IEEE/ACM Transactions on Networking
- IEEE Transactions on Signal Processing
- IEEE Journal on Selected Areas in Communications
- IEEE Transactions on Vehicular Technology
- KICS/IEEE Journal of Communications and Networks
- EURASIP Journal on Applied Signal Processing

REVIEWER OF ACADEMIC CONFERENCES

- The IEEE Global Communications (Globecom) — 08,06, 05, 03
- The IEEE Semiannual Vehicular Technology Conference (VTC) – 08, 06, 03
- The IEEE International Conference on Communications (ICC) – 07, 06, 05
- The International Symposium on Wireless Pervasive Computing (ISWPC) – 06, 05
- The IEE Irish Signals And Systems Conference (ISSC'05)
- The International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine 2005)
- The International Conference on Wireless Networks, Communications, and Mobile Computing (WirelessCom 2005)
- The IEEE Symposium on Computers and Communications (ISCC'05)
- The IFIP International Conferences on Networking (Networking'05)
- The IEEE Wireless Communications & Networking Conference 2005 (WCNC'05)
- The IEEE Infocom 2004

REPORTING COMPILATION ERROR IN NS2-NETWORK SIMULATOR ([HTTP://WWW.ISI.EDU/NSNAM/NS/](http://www.isi.edu/nsnam/ns/))

DETAILED ACADEMIC COURSES AND SKILLS

RELEVANT ACADEMIC COURSES

- Markov Decision Process (audit) **Winter 2006**
 - Queuing Systems for Telecommunications (audit) **Fall 2003**
 - Topics in Electrical Engineering: Transport Layer Protocols **Winter 2002**
 - Optimization Methods for Computer-aided Design **Fall 2001**
 - Wireless Communications & Networking **Fall 2001**
-

RELEVANT ACADEMIC COURSE PAPERS AND PROJECTS

Performance Modeling and Analysis of a Class of ARQ Protocols in Multi-hop Wireless Networks **Winter 2002**

- Analysis of the Markov process and Phase-Type distribution
 - Derive a mathematical framework for analyzing the performance of a multi-hop network
-

Transport Layer: Tutorial and Survey **Winter 2002**

- Present an overview on roles and responsibilities of a transport protocol
 - Provide essential attributes of the widely-used as well as experimental transport protocols
-

A Rate-based Transport Flow Control Technique in Wireless Environment: NETBLT Implementation **Winter 2002**

- A JAVA-based experimental implementation of NETBLT over a wireless network
-

Study on Global Optimization: Genetic Algorithms **Fall 2001**

- Study how the genetic algorithms work
 - Compare the results with local optimization techniques such as Hooke-Jeeves direct method
-

Medium Access Control Protocols for Wireless Mobile Ad Hoc Networks: Issues and Approaches **Fall 2001**

- A comprehensive survey on MAC protocols for wireless ad hoc networks
 - Compare several MAC protocols, discuss about their pros and cons, and suggest possible further studies
-

TECHNICAL TRAINING COURSES

- System engineering for HSS 1100 ATM switch, Telephone Organization of Thailand **2000**
 - O&M for HSS 100 ATM switching, Telephone Organization of Thailand **2000**
-

COMPUTER SKILLS

- Operating System: Windows, Linux, Unix
 - Development Language: C++, Java, Matlab, Perl, NS2
 - Documentation Software: MS-Office, Visio, Latex
-

MISCELLENEOUS INFORMATION

SOCIAL ACTIVITIES

- A member of IEEE communications society
 - A member of The Council of Engineers, Thailand
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OTHER INFORMATION

- Date of birth : December 7, 1976
 - Nationality : Thai
 - Language : English, Thai
 - Hobbies : Photography, Basketball, Table tennis, Jogging, Weight training, Martial Arts, Cooking
-

LIST OF REFERENCES

1. Dr. Vikram Krishnamurthy

Professor and Tier 1 Canada Research Chair in Signal Processing
Department of Electrical and Computer Engineering
The University of British Columbia
2332 Main Mall, Vancouver, British Columbia
Canada V6T 1Z4
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2. Dr. Ekram Hossain

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Department of Electrical and Computer Engineering
University of Manitoba
15, Gillson Street, Winnipeg, Manitoba,
Canada R3T 5V6
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3. Dr. Roger Pederson

President & CEO
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Canada T6G 2V4
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Email: pederson@trilabs.ca

4. Dr. Victor C.M. Leung

Professor and Associate Head, Graduate Affairs
TELUS Mobility Research Chair in Advanced Telecommunications Engineering
Department of Electrical and Computer Engineering
The University of British Columbia
2332 Main Mall, Vancouver, British Columbia
Canada V6T 1Z4
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5. Mr. Jeff Rohne

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Telecommunications Research Laboratories (TRLabs)
100-135 Innovation Drive, Winnipeg, Manitoba,
Canada R3T 6A8,
Telephone: (204) 488-5601
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6. Dr. Li-Chun Wang

Associate Professor
Department of Communication Engineering
National Chiao Tung University
Hsinchu, Taiwan, Republic of China
Telephone: (886) 3-571-2121 ext 54511
Fax: (886) 3-571-0116 ext 54511
Email: lichun@cc.nctu.edu.tw

7. Dr. Dong In Kim

Associate Professor
School of Engineering Science
Simon Fraser University
8888 University Dr., Burnaby, BC, Canada V5A 1S6
Telephone: (604) 291-3248
Fax: (604) 291-4951
Email: dikim@sfu.ca

8. Dr. Mohammad Saquib

Associate Professor
Department of Electrical Engineering
The University of Texas at Dallas
2601 N. Floyd Road, Richardson, Texas, USA 75083-0688
Telephone: (972) 883-4130
Fax: (972) 883-2710
E-mail: saquib@utdallas.edu

9 Professor Tapio Erke

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Asian Institute of Technology,
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