

RESUME

Dr. Milosh V. Ivanovich

B.E. (Hons), M. Comp., Ph.D (I.T.) Monash University, Senior Member IEEE

Melbourne - August 2009

EXECUTIVE SUMMARY

Dr. Milosh V. Ivanovich

B.E. (Hons), M. Comp., Ph.D (I.T.) Monash University, Senior Member IEEE

Education

Ph.D (Information Technology); Master of Computing; Bachelor of Electrical and Computer Systems Engineering (Honours) - Monash University, Australia.

Research Interests

A variety of topics in Performance Analysis, Protocol Optimisation and Traffic Modelling, for cellular wireless and broadband access networks.

Knowledge and Skills

- In-depth domain knowledge in a broad range of fundamental and applied theoretical principles in mathematics, probability theory, queueing theory and computer simulations.
- Strong set of leadership, people / project management, teamwork and communication skills in both the industry and academic contexts.
- Expertise in data link, medium access control and transport layers for a wide range of radio and wireline access technologies, including TCP enhancement in wireless environments.
- Mastery of active and passive performance monitoring methods and architectures.
- Broad networking and computing expertise, ranging from familiarity with diverse networked computing platforms, to proficiency with state-of-the-art tools for network design, emulation and implementation, as well as protocol analysis and simulation.

Achievements and Awards

- Recipient of the Young Australian of the Year 2000 Award (Victorian Division), for contributions to Science and Technology.
- Recognised for contributions to Science and Technology by a range of Victorian State Government and Australian Federal Government prizes and ambassadorial appointments.
- Recognised for numerous academic achievements including: Monash University Medal for Best Doctoral Thesis; Engineers Australia Medal for Most Outstanding Victorian Engineering Graduate, and Monash University Faculty of Engineering prize for Most Outstanding Graduate.
- Recipient of four "Telstra Research Laboratories Outstanding Highlight" awards.

Work Experience: Industry and Academic

- Over 14 years of research and teaching experience in the telecommunications industry and academia, including research team leadership, postgraduate supervision and visiting lecturer roles.
- In excess of 40 academic publications, including 2 book chapters, a provisional patent, an ITU-T standards submission, and peer-reviewed articles in top-level IEEE journals and conferences.
- Honorary Fellow and Associate Ph.D Supervisor at University of Melbourne & Monash University.
- Technical Committee Member, and regular Reviewer for top-tier IEEE journals and conferences.
- Technical Account Manager and Senior System Designer at Optus Communications, accountable for all design, implementation and operational aspects of Australia's largest IP/ATM network (from 1998-2000), known as the Australian Academic and Research Network (AARNet).
- As Research Team Leader, Wireless Network Evolution Section, Telstra Research Laboratories, managed and significantly contributed to project portfolios with >\$10M NPV business impact, spanning multiple financial years and totalling 20+ staff-years centred on (i) radio network performance analysis and dimensioning, (ii) TCP optimisation in a wireless environment, (iii) teletraffic modelling, (iv) performance evaluation of wireless data QoS and (v) developing user- and network-side performance measurement solutions independent of radio access technology.
- As Senior Research Engineer, Network Analysis Section, Telstra Research Laboratories, managed a range of performance analysis, teletraffic modelling and traffic dispersion analysis projects spanning Telstra networks such as the Internet backbone (IP over SDH), FASTPAC, ATM and Hybrid Fibre/Coaxial (HFC) Cable Data.
- As Senior Emerging Technology Specialist, Chief Technology Office, Telstra, responsible for analysing: (i) the suitability of future wireless technologies to the company's framework for service delivery, and (ii) the key related issues of network dimensioning, end-to-end user-perceived QoS and wireless cross layer design.

PERSONAL DETAILS

Name:	Milosh Vladimir Ivanovich
E-mail Address:	milosh@ivanovich.net
Date of Birth:	15th April, 1975
Citizenship:	Australian
Family:	Wife Gordana, sons Dushan, Milan and a daughter Ivanka.
Hobbies and Interests:	Basketball, Tennis, Swimming, Computer Games, Web Surfing and Home Networking.
Personal Web Page:	http://www.ivanovich.net
Professional Memberships:	Senior Member of the Institute of Electrical and Electronic Engineers (SMIEEE)

EDUCATION

Institution:	Monash University, Australia
Qualification:	Ph.D (Information Technology): <i>"Teletraffic Modelling, Analysis and Synthesis of a Generic Broadband Multi-service Access Protocol"</i> <i>Awarded the Mollie Holman Monash University medal for Best Doctoral Thesis of 1998.</i>
Completed:	1998

Institution:	Monash University, Australia
Qualification:	Master of Computing: <i>"Performance Analysis Of Channel Allocation Methods for Half and Full Rate Connections in GSM"</i>
Completed:	1996

Institution:	Monash University, Australia
Qualification:	Bachelor of Electrical and Computer Systems Engineering (Hons): <i>Graduated with First Class Honours as Generation Dux with a High Distinction Average of 92.3%</i> <i>Enrolled in 1991 at the age of 15 years and 9 months as the youngest Faculty of Engineering full-time student.</i>
Completed:	1995

Institution:	University High School, Australia
Qualification:	Victorian Certificate of Education (<i>High School Certificate</i>) <i>Completed at the age of 15, after four years in the University High School's Acceleration Programme</i> <i>Anderson's Score of 389.4 / 400 (97.35%)</i>
Completed:	1990

RESEARCH INTERESTS

Performance Analysis:	(i) Evaluation and dimensioning of cellular data and broadband access networks, with a focus on multiple-priority and hybrid delay/blocking systems; (ii) Radio resource management; (iii) Application of Game Theory to cellular network performance analysis; (iv) Connection Admission Control (CAC) algorithms in wireless systems with multiple QoS classes; (v) Performance evaluation tools based on active probe techniques.
Protocol Modelling and Optimisation:	(i) Evaluation and enhancement of TCP in variable radio conditions for emerging wireless access technologies; (ii) Modelling of Medium Access Control (MAC) contention resolution protocols for wireline and wireless broadband access networks, with a focus on deadlock analysis.
Traffic Modelling:	(i) Measurement and modelling of user traffic from emerging wireless access technologies (2.5G, 3G and beyond).

SUMMARY OF KNOWLEDGE AND SKILLS

Domain Knowledge:	<ul style="list-style-type: none"> • Expertise in a broad range of fundamental and applied theoretical principles in mathematics, probability theory, queueing theory and computer simulations, as applied to analysis, synthesis and performance evaluation of telecommunications systems and networks. • Expertise in the TCP/IP suite, with a focus on protocol optimisation and enhancement in the wireless environment. • Familiarity with state-of-the-art traffic modelling and dimensioning techniques, including simulation and analysis. • Extensive knowledge of the MAC & network layers for a wide range of <u>radio</u> access technologies ranging from 2.5G (GSM/GPRS, cdma2000 1xRTT) to 3G (WCDMA/HSDPA, 1x-EV-DO) and beyond (WiMax/Flarion). • Extensive knowledge of the MAC & network layers for a wide range of <u>wireline</u> access technologies including Cable Data (DOCSIS), ADSL, Ethernet, ATM, and G.703 IP WANs. • Mastery of active and passive performance monitoring methods and architectures, for wireless and wireline networks.
Networking & Computing:	<ul style="list-style-type: none"> • Proficiency in use of diverse networked computing environments: PC (DOS/Windows), Linux (Red Hat/Fedora), Apple (Macintosh, OS X) and UNIX (Solaris, Ultrix). • Proficiency in Visual Basic, C/C++ and PERL programming languages, especially under Windows, in order to produce tools

	<p>that are useable and of commercial value to clients.</p> <ul style="list-style-type: none"> • Proficiency in use of various systems for remote traffic filtering, monitoring and capture (<i>Tektronix, Agilent, Ethereal, NeTraMet, Cisco Netflow</i>). • Proficiency in use of state-of-the-art tools for protocol analysis, focusing on TCP: <i>tcpdump, Ethereal, tcptrace, xplot</i>. • Proficiency in use of network emulators (<i>NistNET</i>) and a wide range of network performance measurement utilities (<i>iperf, netperf, pchar, hping, traceroute</i>). • Capabilities in using mathematical modelling and computation tools such as MathCad and MATLAB. • Capabilities in planning and physically building <u>core</u> ATM and Internet networks, as well as <u>local</u> and <u>wide area</u> networks (LAN/WAN), inclusive of network component configuration procedures for routers, bridges and switches. • Familiarity with network management architectures utilising <i>RMON</i> and <i>SNMP</i>.
<p>Organisational & Commercial:</p>	<ul style="list-style-type: none"> • Strong ability to analyse and specify emerging network and application layer technologies that underpin a telco's delivery of new customer value and growth opportunities. • Strong ability to analyse complex scientific and practical problems with respect to a company's strategic business and customer requirements, and to find solutions on the basis of mathematical modelling and simulation techniques. • Proficient in project management, task prioritisation, and supervision of technical staff in a project leadership role. • Proficient in client relationship management, technical account management, and product management. • Familiarity with relevant standards bodies through active usage and contribution where appropriate (<i>ITU-T, IEEE, IETF, ETSI, 3GPP, 3GPP2</i>).
<p>Leadership, Teamwork & Communication:</p>	<ul style="list-style-type: none"> • Excellent written and oral communication skills : <ul style="list-style-type: none"> - <i>completed Maura Fay courses on Communication, Negotiation and Presentation skills;</i> - <i>numerous examples of recognition for both Telstra (internal) and external publications and presentations.</i> • Proven track record in working as part of a team, and in the ability to motivate and lead teams : <ul style="list-style-type: none"> - <i>selected by the Telstra CEO for the CEO Leaders Program.</i> - <i>selected by the Group Managing Director of the Telstra Technology, Products & Innovation (TTIP) Business Unit, to participate in the "Unleashed High Potentials" program.</i> - <i>selected by the Senior Management of Telstra Research Laboratories (TRL) for the Frontline Manager Program.</i> - <i>nominated via anonymous voting among 300 TRL peers to be one of ten "TRL Star Performer" facilitators, as part of an internal training program aimed at instilling a High-Performance culture.</i>

ACHIEVEMENTS & AWARDS

<ul style="list-style-type: none"> • Recipient, Young Australian of the Year 2000 Award (Victorian Division)
<ul style="list-style-type: none"> • Category winner, Young Australian of the Year 2000 Award (Victorian Division), "Science and Technology"
<ul style="list-style-type: none"> • National runner-up, Young Australian of the Year 2000 Award
<ul style="list-style-type: none"> • Ongoing appointment by Victorian State Government as "Australia Day Ambassador" for contributions to the community, (2000 – present)
<ul style="list-style-type: none"> • Invited by Australian and Victorian Governments to meet Her Majesty Queen Elizabeth II in 2000, in the capacity of Young Australian of the Year and Australia Day Ambassador
<ul style="list-style-type: none"> • Appointed by the Australian Federal Government as one of 100 Australia Day Ambassadors to commemorate the re-enactment of the Centenary of Federation, 2001
<ul style="list-style-type: none"> • Invited by the Foundation for Young Australians to be one of 50 national delegates at the 2001 "Developing the Leaders of Tomorrow" Forum held in Launceston
<ul style="list-style-type: none"> • Recipient, Mollie Holman Monash University Medal for Best Doctoral Thesis of 1998
<ul style="list-style-type: none"> • Recipient, Engineers Australia Ian Langlands Medal for Most Outstanding Victorian Engineering Graduate of 1995
<ul style="list-style-type: none"> • Recipient, 1995 Graeme Beard Memorial prize from Monash University's Faculty of Engineering, for highest overall Honours Weighted Average in the Department of Electrical and Computer Systems Engineering (<i>Generation Dux</i>)
<ul style="list-style-type: none"> • Recipient of four "Telstra Research Laboratories Outstanding Highlight" awards (from 2002 to the present), for research projects including (i) a client-centric active network performance monitoring solution named the "MARVIN" robot; (ii) an interdisciplinary human-factors / engineering study into user perceived Quality of Service (QoS) in wireless environments; (iii) the creation of a Telstra GSM/GPRS Capacity Management Tool; and, (iv) a performance enhancing proxy prototype aimed at enhancing TCP performance over wireless networks
<ul style="list-style-type: none"> • Finalist, Engineers Australia Victorian Engineering Excellence Awards 2005 as principal contributor of Telstra's entry entitled "GSM/GPRS Capacity Management Tool", deployed nationally as an integral part of the Telstra mobile network capacity planning process
<ul style="list-style-type: none"> • Co-author of Australian Provisional Patent entitled "A Proxy Process and System", 2005
<ul style="list-style-type: none"> • Recipient, the Monash University Faculty of Engineering Dean's Scholarship prize for Most Outstanding First Year Student, 1991
<ul style="list-style-type: none"> • Recipient, the Monash University Electrical and Computer Systems Engineering Department SECV FARADAY prize for the Most Outstanding Second Year Student, 1992
<ul style="list-style-type: none"> • Recipient, ACM/SIGCOMM PhD student Travel Grant for attendance at the 1997 ACM/SIGCOMM conference held Cannes, France
<ul style="list-style-type: none"> • Successfully submitted a contribution in 1996 to the world's telecommunications standards making body, the ITU-T (see List of Publications section below)
<ul style="list-style-type: none"> • Co-author of the Best Student Paper Award for the 2003 Australian Telecommunication Networks and Applications Conference (ATNAC), Melbourne Australia

INDUSTRY EXPERIENCE

Company/Business Unit: Telstra Research Laboratories, Radio Networks	
Start Date: February, 2000	End Date: present
Position/Title: Research Team Leader	
Responsibilities:	
<ul style="list-style-type: none"> Managed and significantly contributed to a <u>6 staff-year project portfolio</u> centred on radio network performance analysis and dimensioning, with key outcomes being the design and creation of nationally-deployed Telstra network dimensioning tools used for : (i) GSM/GPRS on a per-cell basis, (ii) the core of 1xRTT and 1xEV-DO networks, (iii) WCDMA/HSDPA on a per-cell basis, and (iv) GSM voice cells providing differentiated QoS (through user blocking probability). 	
<ul style="list-style-type: none"> Managed and significantly contributed to a <u>4 staff-year project portfolio</u> centred on TCP optimisation in a wireless environment. Key activities encompassed detailed protocol analysis, compression performance analysis and load testing of commercially available “web accelerator proxies”. This work gave rise to a novel TRL in-house performance enhancing device aimed at TCP users in a wireless environment (see item 4. in “Highlights” below). 	
<ul style="list-style-type: none"> Managed and contributed to a <u>3 staff-year teletraffic modelling project portfolio</u>, focused on the measurement and statistical profiling of user traffic carried by Telstra’s emerging 2.5G (GPRS) and 3G (1xEV-DO) wireless data networks. Outcomes included commercially valuable insight into the traffic contributions of different user applications and service classes (i.e. GPRS APNs such as .wap / .blackberry / .corporate), as well as validation measurements for our newly proposed long-range dependent teletraffic models at both the single-cell and multi-cell aggregate levels. 	
<ul style="list-style-type: none"> Managed and contributed to a <u>3 staff-year project portfolio</u>, focused on the performance evaluation of wireless data QoS mechanisms provided by Telstra’s GSM/GPRS and WCDMA network equipment vendor. The work revolved around a comprehensive system-level simulation study using the <i>ns-2</i> platform, which scrutinised the performance of QoS class-based MAC scheduling and timeslot allocation algorithms. The business benefit to Telstra of this work was the accelerated implementation of wireless data QoS, and hence enhanced service differentiation and stronger service-level guarantees for high priority users, spurring greater uptake and revenue from premium business and new service (e.g. push to talk) customers. 	
<ul style="list-style-type: none"> Managed and contributed to a <u>4 staff-year project portfolio</u> developing user- and network-side performance measurement solutions independent of radio access technology. The GPS-equipped, script-based, user-side active performance monitoring solution named the “MARVIN” robot, was used in 1xRTT (2002) and Wireless LAN (2003) acceptance tests prior to the respective launches of these two key Telstra wireless products. Similarly, the network-side wireless Speed Test Server (STS) developed as part of this work, allowed Telstra planners and operations staff to obtain key network-layer performance statistics such as peak/average throughput, latency, jitter and loss, for any radio access network (Telstra or competitor) and without the need for any special client-side equipment. 	
<ul style="list-style-type: none"> Ongoing contributions to, and supervision of, various link- and transport- layer protocol analysis tasks: (i) Use of TEMS and Agilent cellular drive-test systems for study of MAC-layer performance of Telstra’s GPRS network; (ii) Use of <i>tcptrace/xplot</i> suite of protocol analysis tools to study TCP performance on radio access networks ranging from 2.5G (GPRS, cdma2000 1xRTT) to 3G (WCDMA/HSDPA, 1x-EV-DO) and beyond (WiMax/Flarion). 	
Highlights:	
<ol style="list-style-type: none"> Recipient of <u>four “Telstra Research Laboratories Outstanding Highlight” awards</u>, as listed in the “Achievements and Awards” section above. 	

2. A recent (2004) Telstra-internal valuation of the ongoing benefit of the three main project portfolios described above (Dimensioning, Traffic Profiling and Performance Measurement), totalled approximately \$4.6M in annualised NPV business benefit, through better performance of, and enhanced customer satisfaction with, Telstra's lynchpin wireless access technologies at that time - GPRS, 1xRTT and Wireless LAN. To place this figure in perspective, the total annual staff budget of the 30-person Radio Networks section was approximately \$2.6M at the time
3. Led the interdisciplinary human-factors / engineering "Wireless User-Perceived QoS" project which, after its 2-year lifetime, shed new light on the complex relationships between network capability and customer acceptance of future wireless data products. The project output was a key contribution to Telstra's successful cdma2000 1xRTT business case in the first half of F.Y. 2002/2003, and significantly influenced the decision in favour of acceptance of this technology.
4. Key learnings from the wireless TCP optimisation work led to a Future-Oriented Research and Development (FORD) project entitled "The TRL Performance Enhancing Proxy (TRL-PEP)", the key outcome of which was the invention, live network testing and provisional patenting of a novel proxy prototype device which outperformed commercially available competitors in a wide range of controlled radio conditions and scenarios.

Company/Business Unit: Optus Communications, Corporate & Government Sales	
Start Date: October, 1998	End Date: November, 1999
Position/Title: Technical Account Manager and Senior System Designer, AARNet	
Responsibilities:	
<ul style="list-style-type: none"> • Manage all aspects of the design and maintenance of the Australian Academic Research Network (AARNet), the largest composite ATM & IP network in Australia at the time • Strategic communications consultancy with direct responsibility for the largest Optus IP/ATM network account (AARNet) valued at over \$30 million per annum at the time • Traffic forecasting, network dimensioning, planning and design of new solutions utilising existing and new products, as well as carrying out desktop feasibility studies • The ISO 9001 quality-certified documentation process was in use for all aspects of the position ranging from requirements specification to technical reports • Excellent people management and communications skills were essential to this role due to the need for coordination of activities carried out by network engineering and operations groups, as well as by external subcontractors 	
Highlights:	
1. Recognised by Optus senior management for successfully producing the first detailed network capacity audit and dimensioning plan since AARNet's migration to Optus	
2. Received a letter of acknowledgment and thanks from the Vice-Chancellors' AARNet technical representatives for the "professional and timely management, on behalf of Optus, of all technical aspects of the AARNet network including design and operation"	

Company/Business Unit: Telstra Research Laboratories, Network Analysis	
Start Date: September, 1995	End Date: October, 1998
Position/Title: Senior Research Engineer	
Responsibilities:	
<ul style="list-style-type: none"> • Managed and significantly contributed to a 5 staff-year project focused on Internet Performance Assessment and Capacity Planning, and the calculation of International Traffic Dispersion for flows carried on Telstra's backbone Internet links. • Significantly contributed to a range of teletraffic modelling and performance analysis projects spanning various Telstra networks such as FASTPAC, ATM and HFC Cable Data 	

- Contributed to the business case for a new ADSL-based architecture for a dedicated line business data product and contributed significantly in requirement specifications
- Successfully created a forecasting tool which predicts the number of expected calls coming in to a Telstra Mobile Telephony Customer Service Centre, in order to facilitate better decisions about staffing levels.

Highlights:

1. Invited by major cellular mobile vendors (Ericsson and Motorola) to present seminars and participate in collaborative research, as a result of novel journal publications on the optimal allocation of half-rate channels in GSM and the impact on system capacity
2. Internationally recognised for innovative modelling work dealing with Telstra's FASTPAC network, through acceptance of a proposed amendment to the ITU-T Standard Recommendation E.716, Study Group 2
3. Recognised by Telstra senior management for contributing to a high-level and high-visibility Telstra project involving the planning, design and costing of a proposal to simplify and make more efficient Telstra's national routed (IP) network infrastructure, by integrating a multitude of IP networks from the Big Pond family of products onto a common ATM backbone infrastructure. An NPV-based cost saving of approximately \$10M was achieved with the implementation of this proposal

ACADEMIC EXPERIENCE

- Department of Electrical & Electronic Engineering, University of Melbourne
 - *Honorary Fellow since 2006,*
 - *Ph.D Associate Supervisor (Automatically Switched Optical Networks) since 2006,*
 - *Invited seminar speaker, Centre for Ultra-Broadband Information Networks, 2001-2004,*
 - *Final Year Project Associate Supervisor, Active queue management techniques for enhancing TCP over wireless (CLAMP), 2003-2004.*
- Swinburne University of Technology's Faculty of Information and Communication Technologies, Visiting Lecturer, 2006 – present :
 - *Teaching "HET 729: DESIGN & MANAGEMENT OF NETWORKS" subject as part of the Master of Information Technology degree.*
- Department of Electrical and Computer Systems Engineering, Monash University
 - *Visiting Lecturer 1998-2000, teaching "ATM Network Design" subject as part of the Master of Engineering degree,*
 - *Honorary Research Fellow and Ph.D Associate Supervisor since 2007.*
- Published book chapter, patent, standards submission, journal articles, as well as published and presented conference papers (see "List of Publications" below).
- Conference Technical Committee Member & Session Chair at:
 - *ATNAC 2003, IEEE TenCon 2005, IEEE VTC Spring 2006, ITC 17th Specialist Seminar 2006, 20th International Teletraffic Congress 2007, IEEE Globecom 2007.*
- Regular reviewer for top-tier IEEE journals and conferences:
 - *Transactions on Networking (ToN), International Journal of Communication Systems (IJCS), International Teletraffic Congress (ITC), Globecom, International Conference on Communications (ICC), Vehicular Technology Conference (VTC).*
- 5+ years experience in mentoring and research-project supervision of 8 Telstra Research Laboratories (TRL) engineers, which in TRL's hybrid industry-academic environment, was equivalent to supervision of higher research degree candidates, with well-defined outcomes for journal and conference publications, patent applications and grant funding.
- Masters Thesis examiner at Monash University's Faculty of Engineering, Department of Electrical and Computer Systems Engineering, 1998 – 2000.
- Invited speaker at the Final Year Engineering Project Fairs held at RMIT University (2002) and Monash University (2004).

REFEREES

Prof. Dr. Moshe Zukerman,

Professor & Chair of Telecommunications,
Department of Electrical and Electronic Engineering,
The University of Melbourne
Parkville, Victoria 3052.

E-mail: mzu@unimelb.edu.au

Prof. Dr. Michael Rumsewicz,

Professor & Director Teletraffic Research Centre,
The University of Adelaide
South Australia, 5005.

E-mail: michael.rumsewicz@adelaide.edu.au

Dr. Paul Fitzpatrick,

Senior Emerging Technology Specialist,
Mobile & Wireless Section,
Chief Technology Office, Telstra
Level 13, 242 Exhibition St.,
Melbourne, Victoria 3000.

E-mail: Paul.G.Fitzpatrick@team.telstra.com

Mr. Tony Beddison,

Chairman of the Board Royal Children's Hospital,
Executive Chairman, SACS Group
Level 14, 303 Collins St,
Melbourne, Victoria 3000.

E-mail: beddison@sacsgroup.com.au

APPENDIX: LIST OF PUBLICATIONS

Books

Sole Author in Edited Book Chapters

1. M. Ivanovich, "Deadlock Models for a Multi-Service Medium Access Protocol Employing a Slotted Aloha or Q-ary Tree Based Signalling Channel", in ***Deadlock Resolution in Computer-Integrated Systems***, M. Zhou and M. P. Fanti (Eds.), pp 493-530, ISBN 9780824753689, Marcel Dekker, 2005.
2. M. Ivanovich, "Enhancing TCP Performance in Hybrid Networks: Wireless Access, Wireline Core", in ***Internet Networks: Wireless, Wireline and Optical Technologies***, K. Iniewski (Ed.), CRC Press, to be published in Oct. 2009.

Contributing Author in Edited Book Chapters

3. M. Ivanovich, M. Hesse, and P. Fitzpatrick, "Paging Performance in GSM Networks: Analysis and Simulation", in ***Providing Quality of Service in Heterogeneous Environments***, J. Charzinsky, R. Lehnert and P. Tran-Gia (Eds.), vol. 5b, pp751-760, ISBN 0-444-51455-4, Elsevier, Proceeding of the 18th International Teletraffic Congress, ITC18, Berlin, August 2003.
4. M. Ivanovich, P. Fitzpatrick and P. Bickerdike, "Resource Allocation Strategies in Hybrid Delay/Blocking Wireless Systems", in ***Performance Challenges for Efficient Next Generation Networks***, X. Liang, Z. Xin, V. B. Iversen and G. S. Kuo (Eds.), ISBN 7-5635-1141-5, Beijing University Post and Telecommunication Press, Proceedings of the 19th International Teletraffic Congress, Beijing, September 2005.
5. T. Sakurai, M. Ivanovich and P. Fitzpatrick, "Approximating the Admission Region for Multi-resource CAC in Wireless Networks", in ***Managing Traffic Performance in Converged Networks***, L. Mason, T. Drwiega, J. Yan (Eds.), pp1060-1071, ISBN 978-3-540-72989-1, Springer, Proceedings of the 20th International Teletraffic Congress (ITC 20), Ottawa, June 2007.

Patents

6. P. Bickerdike, M. Ivanovich, J. Li and C. East, "A Proxy Process and System", *Submitted Australian Provisional Patent*, Melbourne, September, 2005.

International Standards Submissions

7. M. Zukerman and M. Ivanovich, "Proposed editorial clarification to Section 6.3.2.2 of Recommendation E.716: User Demand Modelling in Broadband ISDN", *Delayed Contribution D.318 to Study Group 2, WP 3/2, ITU-T, Geneva, 14-24 May 1996*.

Journal Articles

8. M. Ivanovich, M. Zukerman, P. Fitzpatrick, and M. Gitlits, "Performance comparison between circuit allocation schemes for half and full rate connections in GSM," *IEEE Transactions on Vehicular Technology*, vol. 47, no. 3, August 1998, pp. 790-797.
9. F. Cameron, M. Zukerman, M. Ivanovich, S. Saravanabavanathan and R. Hewawasam, "A Deadlock Model For A Multi-Service Medium Access Protocol Employing Multi-Slot N-Ary Stack Algorithm (msSTART)", *ACM / Baltzer Journal on Wireless Networks (WINET)*, vol. 6, no. 5, 2000, pp. 391-399.
10. M. Ivanovich, M. Zukerman, and F. Cameron, "A study of deadlock models for a multi-service medium access protocol employing a slotted ALOHA signalling channel", *IEEE Transactions on Networking*, vol.8, no.6, December 2000, pp. 800-811.

11. H. Bradlow, A. Saliba, M. Ivanovich, P. Fitzpatrick, "Recognising User Perception in the Design of Telecommunications Networks", *International Engineering Consortium Annual Review of Communications, Volume 58.*, 2004.
12. A. Saliba, M. Beresford, M. Ivanovich, P. Fitzpatrick, "User-Perceived Quality of Service in Wireless Data Networks", *ACM Journal of Personal and Ubiquitous Computing*, Springer publishing, October 2005, pp. 1-10.
13. M. Ivanovich, J. Li and P. Bickerdike, "On TCP Performance Enhancing Proxies in a Wireless Environment", *IEEE Communications Magazine*, vol. 46, no. 9, September 2008, pp. 76-83.
14. Y. A. Sekercioglu, M. Ivanovich and A. Yegin, "A survey of MAC based QoS implementations for WiMAX networks", *Computer Networks Journal*, Elsevier publishing, doi:10.1016/j.comnet.2009.05.001, July 2009.

Conference Papers

15. M. Ivanovich et al., "The AR(1) Process as a Model of MMPP Traffic", *Proceedings of the Australian Telecommunication Networks and Applications Conference (ATNAC '94)*, Melbourne, 1994.
16. M. Ivanovich et al., "Circuit Allocation Schemes for Full and Half Rate Connections in GSM", *Proceedings of ATNAC '95*, Sydney, 1995.
17. M. Ivanovich et al., "Performance Analysis of Circuit Allocation Schemes for Full and Half Rate Connections in GSM", *Proceedings of IEEE Vehicular Technology Conference '96*, Atlanta, 1996.
18. M. Ivanovich et al., "Channel Allocation Schemes for Full and Half Rate Connections in GSM", *Proceedings of IEEE International Conference on Communications inc. SUPERCMM '96*, Dallas, 1996.
19. M. Ivanovich, M. Zukerman and R. G. Addie, "Performance of an IEEE 802.14 MAC Protocol Loaded by Real Traffic", *Proc. of the 8th IEEE LAN/MAN Workshop*, Berlin-Potsdam, August, 1996.
20. M. Ivanovich, M. Zukerman and R. G. Addie, "Performance of an IEEE 802.14 MAC Protocol under Realistic Traffic Conditions", *Proc. of ATNAC '96*, Melbourne, 1996.
21. M. Ivanovich, M. Zukerman and R. G. Addie, "Performance Evaluation of an IEEE 802.14 MAC Protocol under Realistic Traffic Conditions", *Proc., ITC 15*, pp. 857-866, Washington, June, 1997.
22. M. Ivanovich, M. Zukerman and R. G. Addie, "Performance Investigation into an IEEE 802.14 MAC Protocol for HFC Networks", *Proc. ICC '97*, pp. 999-1003, Montreal, June, 1997.
23. M. Ivanovich and M. Zukerman, "IEEE 802.14 MAC Protocol with Priorities", *Proc., Third Asia-Pacific Conference on Communications (APCC'97)*, Sydney, Australia, December 1997.
24. M. Ivanovich and M. Zukerman, "Evaluation of Priority and Scheduling Schemes for an IEEE 802.14 MAC Protocol Loaded by Real Traffic", *Proc., IEEE INFOCOM '98*, San Francisco, April, 1998.
25. M. Ivanovich and M. Zukerman, "Worst case signalling traffic for a multi-service signalling protocol", *Proc. IEEE ICC '98*, Atlanta, June 1998, pp. 1431-1435.
26. M. Ivanovich and M. Zukerman, "Effect of Traffic Correlation on the Performance of a Multi-Service Access Protocol", *Proc. ICT '98*, vol. 1, Chalkidiki, Greece, June 1998, pp. 494-498.

27. M. Ivanovich and M. Zukerman, "A Deadlock Model for a Multi-Service Access Protocol Employing a Slotted Aloha Signalling Channel", *Proc. ICT '98*, vol. 1, Chalkidiki, Greece, June 1998, pp. 499-503.
28. F. Cameron, M. Zukerman, M. Ivanovich, S. Saravanabavanathan and R. Hewawasam, "A Deadlock Model For A Multi-Service Medium Access Protocol Employing Multi-Slot N-Ary Stack Algorithm (msSTART)", *Proceedings of IEEE WmATM'99*, San Jose, June 1999.
29. M. Ivanovich, R. Mukhtar, S. Hanley, H. Vu, and P. Fitzpatrick, "Analysis of TCP Performance over Hybrid 'Fast Fixed - to - Slow Wireless' Buffered Links", *Proc. IEEE Globecom 2001*, vol. 3, San Antonio, November 2001, pp. 1816 - 1820.
30. P. Fitzpatrick, M. Ivanovich and J. Yin, "Models for Pre-emption of Packet Data by Voice in Slotted Cellular Radio", *Proc. Globecom 2002*, Taipei, November 2002.
31. M. Ivanovich, P. Fitzpatrick, J. Li, M. Beresford and A. Saliba, "Measuring Quality of Service in an Experimental Wireless Data Network", *Proceedings of the Australian Telecommunication Networks and Applications Conference (ATNAC '03)*, Melbourne, 2003.
32. K. Allen, P. Fitzpatrick, and M. Ivanovich, "Joint Traffic and Signalling Capacity Analysis in GSM", *Proceedings of the Australian Telecommunication Networks and Applications Conference (ATNAC '03)*, Melbourne, 2003.
33. M. Ivanovich, J. Li, T. Neame, J. Yin, P. Fitzpatrick, "GPRS Data Traffic Modelling", *Proceedings of the International Teletraffic Congress Specialist Seminar on Performance Evaluation of Wireless and Mobile Systems - ITC-SS 16*, Antwerp, 2004.
34. M. Ivanovich, P. Fitzpatrick, M. Beresford, A. Saliba, "An empirical 3-D User Satisfaction Model in Wireless Data Networks ", *Proceedings of the 15th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications - PIMRC 2004*, Barcelona, 2004.
35. M. Ivanovich, J. Li, T. Neame, P. Fitzpatrick, "Modelling GPRS Data Traffic", *Proceedings of Globecom 2004*, Dallas, December 2004.
36. P. Fitzpatrick, M. Ivanovich and P. Bickerdike, "Hybrid Delay/Blocking Wireless Systems with Greedy Resource Allocation", *Proceedings of IEEE Tencon 2005*, Melbourne, November 2005.
37. T. Sakurai, M. Ivanovich and P. Fitzpatrick, "Approximating the Admission Region for Multi-resource CAC in Wireless Networks", *Proceedings of the International Teletraffic Congress Specialist Seminar on Teletraffic Engineering Challenges for Next Generation Mobile Networks - ITC-SS 17*, Melbourne, May 2006.
38. P. Fitzpatrick and M. Ivanovich, "On Hybrid Delay/Blocking Wireless Systems with Pre-emption and QoS", *Proceedings of the Australian Telecommunication Networks and Applications Conference (ATNAC '06)*, Melbourne, December 2006.
39. J. Li, K. Hinton, M. Ivanovich, P. Fitzpatrick, P. Farrell and S. Dods, "Outage and Capacity Based Path Selection in Optical Networks", *Proceedings of the 33rd European Conference and Exhibition on Optical Communication (ECOC 2007)*, Berlin, September 2007.
40. P. Fitzpatrick and M. Ivanovich, "The Impact of Bursty Data on Hybrid Delay/Blocking Wireless Systems with QoS", *Proceedings of the Australasian Telecommunication Networks and Applications Conference (ATNAC '07)*, Christchurch, December 2007.
41. M. Ivanovich and P. Fitzpatrick, "Throughput Metrics in Beyond 3G Wireless Systems with Complex Rate Variability and QoS", *Proceedings of the 19th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications - PIMRC 2008*, Cannes, 2008.
42. P. Fitzpatrick and M. Ivanovich, "On Approximating Throughput in Wireless Systems with Complex Rate Variability and QoS", *Proceedings of the Australasian Telecommunication Networks and Applications Conference (ATNAC '08)*, Adelaide, December 2008.