Curriculum Vitae

Raouf BOUTABA

PERSONAL

Personal Address:	30 Blue Springs Dr. #306, Waterloo, ON., N2J 4T2, Canada Tel: (519) 883-7833
Professional address:	Computer Science Department, University of Waterloo Waterloo (Ontario) , N2J 3G1 Canada Tel: (519) 888-4567 x.4820, Fax: (519) 885-1208 Email: rboutaba@bbcr.uwaterloo.ca
Hobbies:	reading, cooking, and volleyball
Languages:	Speaks and writes English, French and Arabic

EDUCATION

Ph.D.	Computer Sciences	University Pierre & Marie Curie (Paris VI), France	1994
Magister	Computer Sciences	University of Annaba (Algeria) & University of Glasgow (Scotland)	1993
Master's	Computer Sciences	University Pierre & Marie Curie (Paris VI), France	1990
Dipl. Engineer	Computer Engineering	University of Annaba (Algeria)	1988

ACADEMIC, RESEARCH AND PROFESSIONAL EXPERIENCE

Positions held	**Organizations**	**Dates**
Assistant Professor	Computer Science Department University of Waterloo, Waterloo, Canada	1999 - present
Assistant Professor	Electrical and Computer Engineering Department University of Toronto, Toronto, Canada	1998 - 1999
Director	Telecommunications & Distributed Systems Division Computer Sciences Research Institute of Montreal (CRIM) Montreal, Canada	1995 - 1998
Adjunct Professor	Computer science department University of Montreal, Montreal, Canada	1995 - present
Assistant Professor	Computer sciences department University of Evry, Paris, France	1993-1995
Research Scientist	PRISM Lab., Computer science department University of Versailles, Versailles, France	1994-1995
Research Scientist	MASI Lab., Computer science department University of Paris VI, Paris, France	1990-1994

RESEARCH MANAGEMENT

1999-present, Computer Science Department, University of Waterloo

- Responsible of Network Management Group within the Network and Distributed Systems Lab.
- Responsible for several research projects Project sponsored by Nortel Networks, the Canadian Institute for Telecommunication Research, the Natural Sciences and Engineering Research Council, Bell-University Labs, OpenText Ltd.
- Supervise several Graduate students at Master's and Ph.D. levels as well as Post-doctoral Fellows.

1998-99, Electrical and Computer Engineering Department, University of Toronto

- Responsible of NRM (Network Resource Management) Project in Network Architecture Lab.
- Project sponsored by Nortel Networks in the scope of the Chair in Network Architecture and Services held by Professor Alberto Leon-Garcia.
- Project involves several Graduate students at Master's and Ph.D. levels.

1995-98, Computer Science Research Institute of Montreal

- Built and led the Telecommunications and Distributed Systems Division
- Built a collaboration network with universities and industries
- Supervised research personnel (5 researchers, 3 advisers, 5 research agents & 17 students)
- Launched and conducted contracted projects
  - 11 projects; total yearly income of $ 343 000 (95-96), $ 1 457 372 (96-97) and $ 2 130 974 (97-98).

1996-97

- Coordinator of Major EPAC Project (Partners: Eicon Technologies, Positron Fiber Systems and AIKS)
- Research leader for 2 subprojects part of the EPAC project
  - Areas: "Network Management" and "Multimedia Communications"
- Research leader for the ATLAS Project (Partner: Ericsson Research Ltd.)
  - Area: Fault Management in Mobile Cellular Networks
- Research leader for the ICS Project (Partners: MediaSoft Inc., IntelliMedia and NRC)
  - Area: Multimedia Interactive Communication Systems

1995-97

- Technical responsible of 1 axis in the major IGLOO Project (Partners: NSERC and 6 Companies)
  - Area: Application of Object-Oriented Specification Methods to Distributed Systems Management

1995-96

- Scientific advisor for the Madagascar Project
  - Partners: Bell and Teleglobe (Montreal), and NRC (Ottawa).
  - Area: Integration of Movies Pre- and Post Production Applications over Broadband Networks

1994-95, PRISM Laboratory, University of Versailles

- PRiSM Technical co-responsible for the European ICM Project part of the Race (now ACTS) Program
  - Partners: Cray Communications (UK), Alcatel ISR (France), Alpha SAI (Greece), Ascom Tech AG (Germany), Monetel (France), CET (Portugal), Electronik Centralen (Sweden), Nokia Corporation (Finland), ICS-Forth (Greece), NTUA (Greece), Univ. QMW (UK), University College London (UK) and several other partners (Unipro Ltd., Univ. of Durham, GN Elmi AS,VTT).
  - Area: Integrated Communication Management of Broadband Networks

1990 –94, MASI Laboratory, Pierre & Marie Curie University (U. Paris6)

- MASI Technical responsible for European DOMAINS Project part of the ESPRIT-II Program
  - Partners: Siemens (Germany), Harwell (UK), Telesystemes (France), Philips (Germany), MARI Research (UK), NTUA (Greece) and APM Technologies (UK).
  - Area: Integrated Management of Networked Systems

RESEARCH GRANTS (since 1996)**:**

Title	Source	Amount ($CND)
"Billing in Programmable Networks"	Canadian Institute for Telecom. Research (CITR)	42,000.00
"Ad-hoc Networking"	Nortel Networks	180,000.00
"Network Management and Active Networks"	NSERC	109,616.00
"Applications of Programmable Network Concepts to Internet"	Canadian Institute for Telecom. Research (CITR)	78,000.00
"Change management in dynamic telecommunications networks"	Nortel Networks	375,000.00
Start-up Grant	University of Waterloo	30,000.00
"Distributed, Integrated, Intelligent and Automated Network and Systems Management",	NSERC	90,000.00
"Intelligent fault management in mobile cellular networks",	Ericsson Canada	900,000.00
"Deployment of a Multimedia Networking Testbed"	Eicon Technologies & Positron Fiber Systems	600,000.00
"Definition of a Highly Scalable Server Architecture for supporting Multimedia Games over the Internet"	iXmedia	7625.00
"Interactive Multimedia Communications" MediaSoft Telecom.	MediaSoft Telecom.	20,000.00
"Agent-based Distributed Management of Computer Networks"	Eicon Technologies	186,732.00
"Implementation of a TMN platform for managing Sonet Networks"	Positron Fiber Systems	445,527.00
"Definition of a High Capacity Network Architecture for supporting virtual studios"	Bell Canada & Teleglobe	8,000.00
"Distributed system for supporting multimedia applications over broadband networks"	Stentor	25,000.00

MOST SIGNIFICANT RESEARCH CONTRIBUTIONS

"Programmable Control and Management of ATM/Internet networks"

My most recent research contribution concerns flexible and customizable design, operation and management of virtual networks (VNs). A VN is the result of the partitioning of resources in the provider's shared communication infrastructure and the dynamic allocation of these resources to customers. The design of VNs and their customized management is effectively achieved through logical partitioning of Management Information Bases (MIBs). The MIBlet concept [43] has been introduced as a means to provide abstract and selective views of the physical network resources allocated to customers. The concept has been experimentally evaluated in an ATM-based testbed where different resource partitioning schemes have been implemented to provide ATM VNs with differing QoS requirements. Various IP services have been supported over the configured ATM VNs. An open and portable software prototype of the VN programmable control and management system has been implemented and demonstrated through a VN-based performance monitoring [10]. Although this work has just recently been published, we believe that it will be recognized as a major contribution to managing virtual and programmable networks.

"Integrated and Automated Management of Network and Distributed Systems"

My major research contribution is in the area of integrated management of networks and distributed systems. It is mainly the automation of the process of managing large-size heterogeneous networked systems [25]. More precisely, we formalized management domain and policy concepts [77]. I have introduced a new hierarchical and generic model for the management activity supporting both proactive and reactive processes. Also an object-oriented model for describing managed resources and managing entities has been defined. These concepts have been applied over the years to automated configuration management [62] and automated alarm correlation and fault management [18, 60]. They have also been applied to managing various technologies including FDDI networks [76], ATM networks [73], mobile cellular networks and Multimedia Virtual Private Networks. The concepts have been experimented through the development of management systems/applications using the Web and mobile agents [40] as well as SNMPv3 and directory services [42]. Some of these contributions have been referenced by and have influenced the thinking of respected authorities in the network management community. Hierarchical management and policy-based management have recently gained a tremendous acceptance in academia and industry.

"Quality of Service Control for Compressed Video Communications over ATM best effort services"

A significant research has been made on traffic management mechanisms at the ATM, AAL and MPEG Transport layers to reduce images quality degradation during congestion periods [22]. Contributions include existing related mechanisms such as performance studies of ABR/UBR+ services' ability to support non-interactive video applications [13], better strategies for MPEG data encapsulation on top of ATM-AAL 5 [48], and optimized mechanisms for video data partitioning and prioritizing at the sources level. A new mechanism for dynamic and selective video cells discarding has also been proposed at the MPEG Video Slice layer [31, 55]. A Forward Error Correction mechanism has been integrated at the AAL 5 Service Specific layer. Performance measures have shown that the proposed mechanisms yield a new effective approach for traffic management at the ATM level favoring optimized transport of multimedia traffic. This work has been referenced in several papers including state of the art survey. It is among the earliest works on quality control of video communications over ATM best effort services.

"Quality of Service Management in Multimedia Wireless Mobile Networks"

In this work we introduced a multi-agent architecture for QoS management in Wireless ATM (WATM) networks [47]. The architecture is specifically suitable for video transmission over UBR services using a per-VP queuing approach and a congestion control scheme based on adaptive cell discarding. During handoffs, a dynamic reconfiguration of the agents and a handoff delay absorption process are performed in order to continue meeting user QoS requirements [16]. We believe that this contribution will have a great impact in the research community with the recent emergence of active programmable architectures. Also in the area of multimedia wireless networks, we analyzed the statistical data sets of several MPEG encoded videos and proposed a model of the elements of a video scene. The model is used to allocate bandwidth dynamically on a scene basis. We developed and evaluated a new dynamic bandwidth allocation scheme for MPEG video sources suitable for wireless networks [36]. The performance evaluations showed a major improvement in bandwidth utilization as compared to static schemes available in the literature. This result is of extreme importance given that bandwidth is a precious resource in wireless mobile networks and will help mobile network operators in balancing the opposing objectives of reducing service cost, supporting a larger number of users, and guaranteeing QoS. Furthermore, to guarantee that the network continue providing the required level of QoS when multimedia users move to adjacent cells, we have designed a novel Call Admission Control scheme [29] that involves not only the cell that receives the call admission request but also a cluster of neighboring cells. Using this scheme, the network will provide a low call dropping probability while maintaining high resource utilization [28].

"Resource Allocation in Distributed and Multimedia Systems"

My earliest research contribution is in the area of load balancing in distributed systems. I have designed and implemented multi-criteria load balancing algorithms distributing automatically and transparently application programs in heterogeneous LANs [74, 81]. In addition to the distributed system global state, the algorithms take into account application programs' execution needs in terms of CPU, memory, file access and network resources. The algorithms have been implemented for efficient execution management

of distributed applications. Furthermore, the implemented load-balancing system integrates fault tolerance features [78]. These research results have been more recently used to define a scalable access scheme to multimedia objects in a distributed environment. We have designed a scalable video on demand system allowing for a higher availability of video servers and thus a better QoS to end-users [20]. The results have been also adapted to optimize resource utilization in a distributed video production environment [12]. The latter work, which promotes the concept of virtual studio, is particularly important given the high cost of video production equipment. It can benefit the growing entertainment market.

PUBLICATIONS

PATENTS

1. Software Faults Isolation System for Wireless Cellular Switches. Serial Number 60/031. Filed in the US Patent and Trademark Office, August 21, 1997. Issued Jan 4, 2000. Patent # 6,012,152.

BOOKS (EDITED)

2. Managing QoS in Multimedia Networks and Services, by Jose Neuman de Souza and Raouf Boutaba (eds.), Kluwer Academic Publishers, 2000.
3. Management of Multimedia Networks and Services, Raouf Boutaba and Hafid Abdelhakim (eds.), Chapman & Hall, 1997.
4. Feature Interactions in Telecommunication Networks, by Petre Dini, Raouf Boutaba and Luigi Logrippo (eds.), IOS Press 1997.

EDITORIALS

5. Active Management of Multimedia Networks and Services, Raouf Boutaba and Alberto Leon-Garcia, Special issue of Journal of Network and Systems Management (JNSM), Plenum Press, NY, Vol.8, No.1, March 2000.
6. QoS Management in Multimedia Networks, Raouf Boutaba and Jean-Pierre Claude (Guest editors) International Journal on Interoperable Communication Networks, Baltzer Science Publishers & ACTS, Vol.2, N° 4, January 2000.
7. Resource Management in Wireless Networks, Raouf Boutaba, Joakim Kalvenes and Guy Pujolle, Special issue of Mobile Networks and Applications Journal, ACM/Blatzer Science Publishers, Vol.4, No.2, May 1999.

REFEREED JOURNAL PAPERS, PUBLISHED OR ACCEPTED FOR PUBLICATION

8. Resource Management Issues in Future Multimedia Networks, Youssef Iraqi and Raouf Boutaba, accepted in International Journal of High Speed Networking, Special issue on the Management of Multimedia Networking, to appear 2001.
9. Supporting MPEG Video VBR Traffic in Wireless Networks, Raouf Boutaba and Youssef Iraqi, accepted in International Computer Communications Journal, Elsevier Science, 2001.
10. Web-based Customer Management of Virtual Private Networks, Raouf Boutaba, W. Ng and A. Leon-Garcia, accepted in International Journal of Networks and Systems Management, Special issue on Web-based Management, to appear in 9(1), March 2001.
11. Multi-agents Architecture for Self-regulating Congestion Control in ATM Networks, Y. Iraqi, A. Mehaoua and Raouf Boutaba, accepted in International Journal of Network and Systems Management, Plenum Press, NY, 2001.

12. Distributed Video Production: Tasks, Architecture and QoS Provisioning, Raouf Boutaba, N. Red, Y. Rasheed and A. Leon-Garcia, accepted in Multimedia Tools & Applications Journal, Kluwer Academic Press, to appear 2001.
13. An Integrated Framework for Efficient Transport of Real-time MPEG Video Over the UBR Best Effort Service, A. Mehaoua, R. Boutaba, Y. Rasheed, A. Leon-Garcia, to appear in Real Time Imaging Journal, Special issue on Adaptive Real-time Multimedia Transmission over Packet Switching Networks, 2001.
14. MPEG Video Transmission over Broadband ISDN, Mehaoua and R. Boutaba, in Journal of Parallel Computers, Special issue on Telecommunications Services Engineering, Oxford-Hermes Science Publishing, Vol.12, No. 2, 2000.
15. Load Balancing of Hierarchical MPEG2 Video Streams over VBR-RT and ABR Services , Mehaoua and Raouf Boutaba, in ICON, International Journal on Interoperable Communication Networks, Baltzer Science, Publishers, Vol.2, N° 4, January 2000.
16. Quality of Service Control in Wireless ATM Netwoks, Youssef Iraqi, Raouf Boutaba and Alberto Leon-Garcia, in the ACM/Baltzer Journal on Mobile Networks and Applications (MONET), Vol.5, N° 2, pp. 137-145, 2000.
17. Performance Evaluation of Block Error Correcting Codes for High Speed Wireless Commuication Links, H. Labiod and Raouf Boutaba, in ICON, International Journal on Interoperable Communication Networks, Baltzer Science Publishers, Vol.2, N° 4, January 2000.
18. A Framework for Alarm Correlation and Fault Diagnosis, Mahamat Guiagoussou, Raouf Boutaba and Gregor V. Bochmann, In International Journal on Networking and Information Systems, Oxford-Hermes Science Publishing, Vol. 2, N° 4, pp. 459-482, 1999.
19. Active Nets: Principles and Applications, Ahmed Mehaoua, Zhang Fan, Spyros Denazis and Raouf Boutaba, In International Journal on Networking and Information Systems, Oxford & Hermes Science Publishing, Vol. 2, N° 1, pp. 25-46, 1999.
20. A Generic Platform for Scalable Access to Multimedia-on-Demand Systems, Raouf Boutaba and Abdelhakim Hafid, In IEEE Journal on Selected Areas in Communications, Special Issue on Service Enabling Platforms for Networked Multimedia Systems, Vol. 17, N° 9, pp. 1599-1613, Sep. 1999.
21. Evolution of Telecommunication Management toward Distributed, Intelligent and Cost-effective Architectures, Nazim Agoulmine and Raouf Boutaba, in International Journal on Networking and Information Systems, Oxford-Hermes Science Publishing, Vol. 1, N° 4-5, pp. 433-468, October 1998.
22. Adaptive Picture-based Discarding Schemes for ATM Video Networking, Ahmed Mehaoua and Raouf Boutaba, in Computer Networks and ISDN Systems Journal, Elsevier Science, North Holland, Vol. 29, issue 17-18, pp. 2021-2037, 1998.
23. An Outlook to Intranet Management, Raouf Boutaba, Karim El-Guemhioui and Petre Dini, IEEE Communications Magazine, Special issue on Intranet Services and Communication Management, October 1997.
24. A Distributed Open Platform and its Federation for Tools Inter-working in Software Engineering Environments, Raouf Boutaba and Karim Foughali, Integrated Computer Aided Engineering Journal, Eds. J. Wiley & Sons Inc., vol.3, no.3, 1996.
25. An Architectural Approach for Integrated Networks and Systems Management, Raouf Boutaba and Simon Znaty, ACM-SIGCOM Computer Communication Review, vol.25, no. 5. Oct 1995, pp. 13-39.

REFEREED CONFERENCE AND WORKSHOP PAPERS

26. Towards Extensible Policy Enforcement Points, Raouf Boutaba and Andreas Polyrakis, Accepted for presentation in IEEE Workshop on Policies for Distributed Systems and Networks, Bristol, UK, January 29-31, 2001

27. A Multi-Agent System for Resource Management in Wireless Mobile Multimedia Networks, Youssef Iraqi and Raouf Boutaba, in the 11th IFIP/IEEE International Workshop on Distributed Systems: Operations & Management (DSOM-2000), Austin, Texas, 4-6 December, 2000.
28. An Adaptive Distributed Call Admission Control for QoS-Sensitive Wireless Mobile Networks, Youssef Iraqi and R. Boutaba, in IEEE Wireless Communications & Networking Conference (WCNC), Chicago, 23-28 September 2000.
29. A Novel Distributed Call Admission Control for Wireless Mobile Multimedia Networks, Youssef Iraqi and Raouf Boutaba in Proceedings of the Third ACM International Workshop on Wireless Mobile Multimedia (WoWMoM-2000), Boston, 11 August, 2000.
30. Network Security Management with Intelligent Agents, K. Boudaoud, H. Labiod, R. Boutaba and Z. Guessoum, in Proceedings of IFIP/IEEE International Network Operation and Management Symposium (NOMS'00) , IEEE Press, pp. 579-792, Hawaii, April 2000.
31. FEC-PSD : An intelligent Video Drop Policy with Forward Error Correction, A. Mehaoua, S. Zhang, R. Boutaba and S. Pu, in Proceedings of IEEE Global Communications Conference (GLOBECOM'99) , Rio de Janeiro, Brazil, December. 1999.
32. Enterprise Directory Support for Future SNMPv3 Network Management Applications, Salima Omari, Raouf Boutaba and Omar Cherkaoui, in Proceedings of IEEE Global Communications Conference (GLOBECOM'99) , Rio de Janeiro, Brazil, December 1999.
33. Distributed Video Production : Tasks, Architecture and QoS Provisioning, N. Red, R. Boutaba, Y. Rasheed and A. Leon-Garcia, in Proceedings of International Conference on Multimedia Modeling (MMM'99), Ottawa, Canada, October 1999.
34. Directory Supported Management with SNMPv3, Salima Omari, Raouf Boutaba and Omar Cherkaoui, in Proc. of the First International Workshop on Mobile Agents For Telecommunication Applications (MATA'99), Ottawa, Canada, October 1999.
35. Policy-based Control Agents for Boundary Routers in Differenciated Services IP, Salima Omari and Raouf Boutaba, in Proc. IFIP/IEEE International Workshop on Distributed Systems : Operations & Management (DSOM'99), Zurich, Switzerland, Elsevir, October 1999.
36. Statistical Properties of MPEG Video Traffic and their Impact on Bandwidth Allocation in Wireless ATM Networks, Youssef Iraqi, Raouf Boutaba and Rachida Dssouli, in the IEEE Wireless Communications and Networking Conference (WCNC'99), New Orleans, LA,USA, September 1999.
37. A Dynamic Bandwidth Allocation Algorithm for MPEG Video Sources in Wireless Networks, Youssef Iraqi and Raouf Boutaba, in Proceedings of 3rd ACM International Workshop on Discrete Algorithms and Methods for Mobile Computing and Communications (DialM99), Seattle, WA, 20 August, 1999.
38. Proposal of an Audiovisual SSCS with Forward Error Correction, Ahmed Mehaoua, Raouf Boutaba, and Jean-Pierre Claudé, in Proceedings of IEEE Symposium on Computers and Communications (ISCC'99), Red Sea, Egypt, July, 1999.
39. SNMPv3 Configuration Policies, Salima Omari, Raouf Boutaba and Omar Cherkaoui, in Proceedings of Networks and Services Management Conference (GRES'99), Montreal, Canada, June 7-10, 1999.
40. Mobile Java Scripts based Middleware for Management-by-delegation, Adel Ghlamallah and Raouf Boutaba, in Proceedings of Networks and Services Management Conference (GRES'99), Montreal, Canada, June 7-10, 1999.
41. Towards An Efficient Best Effort Video Delivery Service, Ahmed Mehaoua, Raouf Boutaba, Song PU, Yasser Rasheed and Alberto Leon-Garcia, in Proceedings of IEEE International Conference on Communications (ICC'99) , Vancouver, Canada, June 1999.
42. Policies in SNMPv3-Based Management, Salima Omari, Raouf Boutaba and Omar Cherkaoui, in Proceedings of IFIP/IEEE Int. Symp. on Integrated Network Management (IM'99), Boston, June 1999.

43. MIBlets: A Practical Approach to Virtual Network Management, Walfrey Ng, Andrew Do-Sung Jun, Hungkei Keith Chow, Raouf Boutaba and Alberto Leon-Garcia, in Proceedings of IFIP/IEEE International Conference on Integrated Network Management (IM'99), Boston, USA, June 1999.
44. QoS Control in WATM, Youssef Iraqi, Raouf Boutaba and Alberto Leon-Garcia, in Proceedings of the second IEEE International Workshop on Wireless Mobile ATM Implementations (wmATM'99), San Francisco, USA, June 1999.
45. Provision and Customization of ATM Virtual Networks for supporting IP Services, Walfrey Ng, Raouf Boutaba, and Alberto Leon-Garcia, in Proceedings of IEEE ATM Workshop, Kochi, Japan, May 1999.
46. The Impacts of Errors and Delays on the Performance of MPEG2 Video Communications, Ahmed Mehaoua and Raouf Boutaba, in Proceedings of IEEE International Conference On Acoustics, Speech, and Signal Processing (ICASSP'99), Phoenix, Arizona, March 1999.
47. Configurable Multi-Agent System For QoS control in WATM, Youssef Iraqi, Raouf Boutaba and Ahmed Mehaoua, in Proceedings of IEEE GLOBECOM' 98 , Sydney, Australia, November 1998.
48. Partial versus Early Video Packet Discard, Ahmed Mehaoua, Raouf Boutaba and Youssef Iraqi, in Proceedings of IEEE GLOBECOM' 98 , Sydney, Australia, November 1998.
49. Implementing a Distributed Web-based Management System in Java, Adel Ghlamallah and Raouf Boutaba, in IEEE International Telecommunications Symposium (ITS'98), São Paulo, Brazil, August 9-13, 1998.
50. A Domain Approach to the Management of Multimedia Virtual Private Networks, Raouf Boutaba and Ahmed Mehoua, in Proceedings of World Multiconference on Systemics, Cybernetics and Informatics (SCI/ISAS'98), Orlondo, USA, July 12-16, 1998.
51. A hybrid VBR/ABR Service for Layered Video Communications: A Simulation-based Analysis, Ahmed Mehaoua and Raouf Boutaba, in Proceedings of IEEE International Workshop on Broadband Switching System'97 (BSS'97), Taipei, Taiwan, 3-4 December 1997.
52. A Scalable Video-on-Demand System: Architecture and Implementation, A.Hafid, P.Dini, M.Hafid and R.Boutaba, in Proceedings the 13th International Conference for Computer Communications (ICCC'97), Cannes, France, 19-21, November, 1997.
53. Performance Analysis of a Partial Slice-based Discard Scheme (Adaptive-PSD) for MPEG Video over UBR+ Service Ahmed Mehaoua and Raouf Boutaba, in Proceedings of 13th IFIP International Conference for Computer Communications (ICCC'97), Cannes, France, 19-21 November 1997.
54. Webifying Network Management, Karim El-Guemhioui and Raouf Boutaba, in Proceedings of International Conference on New Technologies for Distribution (NOTERE'97), Pau, France, November 1997.
55. Performance Evaluation of QoS Control Techniques for Best Effort Video Networking over ATM, Ahmed Mehaoua and Raouf Boutaba, in Proceedings of IEEE 22nd Annual Conference on Local Computer Networks (LCN'97), Minneapolis, Minnesota, U.S.A, 2-5 November 1997.
56. A Multi-agents Architecture for Video Quality Control in ATM Networks, Youssef Iraqi, Adel Ghlamallah, Ahmed Mehaoua et Raouf Boutaba, in Proceedings of International Conference on Networks and Services Management (GRES'97), Rennes, France, September 22-25, 1997.
57. An Adaptive Early Slice Discard (A-ESD) Scheme with multi-priority support for Best Effort Video over ATM Networks, Ahmed Mehaoua, Raouf Boutaba et Guy Pujolle, in Proceedings of IEEE International Conference on Information, Communications and Signal Processing (ICICS'97), Singapore, Sept. 1997.
58. A Scalable Scheme to Access Multimedia Documents with QoS Guarantees, A.Hafid and R.Boutaba, in International Workshop on Interactive Distributed Multimedia Systems and Telecommunication Services (IDMS'97), Darmsdat, Germany, September, 1997.

59. Integrated Control and Management Policies for Video over ATM Networks, Ahmed Mehaoua, Raouf Boutaba and Guy Pujolle, in Proceedings IEEE International Symposium on Computers and Communications (ISCC'97), Alexandria, Egypt, 1-3 July 1997.
60. A TMN Framework for Fault Diagnosis in Wireless Telecommunication Networks, Mahamat Guiagoussou, Raouf Boutaba, in Proceedings IEEE International Symposium on Computers and Communications (ISCC'97), Alexandria, Egypt, 1-3 July 1997.
61. New Models for Applying Automatic Reconfiguration in Networks and Distributed Systems, Petre Dini, Gregor v. Bochmann and Raouf Boutaba, in European Conference on Intelligent Management Systems in Operations, University of Salford, U.K., May 25-26, 1997.
62. Deriving Variable Polling Frequency Policies for Proactive Management in Networks and Distributed Systems, Petre Dini and Raouf Boutaba, in Proceedings of IFIP/IEEE International Conference on Integrated Network Management (IM'97), San Diego, CA, USA, May 12-16, 1997.
63. Intelligent Management System for Fault Diagnostic in Cellular Telecommunication Networks, Raouf Boutaba, in Proceedings of the IEEE International Conference on Telecommunications (ICT'97), Melbourne, Australia, April 2-4, 1997.
64. Telecommunication Networks, Alarm Correlation and Fault Diagnosis: A Relation-based Approach Mahamat Guiagoussou, Raouf Boutaba and Gregor v. Bochmann, in Proceedings of the IEEE International Conference on Telecommunications (ICT'97), Melbourne, Australia, April 2-4 1997.
65. Load balancing of scalable MPEG2 streams between VBR and ABR connections, Ahmed Mehaoua and Raouf Boutaba, in Proceedings of the IFIP Fifth International Conference on Telecommunication Systems Modeling and Analysis, Nashville, USA, 20-23 March 1997.
66. MPEG over ATM : An integrated QoS Control approach, Raouf Boutaba and Ahmed Mehaoua, in Proceedings of Telecommunication Networks and Applications conference'96 on Delivering Quality Services, Melbourne, Australia, December 4-6, 1996.
67. A Picture Quality Control Framework for MPEG video over ATM, Ahmed Mehaoua, Raouf Boutaba and Guy Pujolle, in Proceedings of IFIP/IEEE Fifth International Workshop on Protocols for High Speed Networks (PfHSN'96), Sophia-Antipolis, France, October 1996.
68. The two real-time Solitudes : Computerized control and Telecommunications, Paul Freedman, Daniel Gaudreau, Raouf Boutaba and Ahmed Mehaoua, in Proceedings of IEEE Fourth International Workshop on Real-time Applications (WRTA'96), Montreal, Qc, Canada, October 1996.
69. Human & Automatic Policies in Concert: A Policy-Driven approach to Manage Distributed Systems, Petre Dini, Raouf Boutaba and Gregor v. Bochmann, in Proceedings of IEEE-SMC Computational Engineering in Systems Applications (CESA'96), Lille, France, July 9-12, 1996.
70. Health Performance Evaluation and Formalization for Distributed System Components, Petre Dini, Gregor v. Bochmann and Raouf Boutaba, in Proceedings of the Second IEEE Systems Management Workshop, Toronto, Canada, June 19-21, 1996.
71. Applying the Policy Concept to the Management of ATM Networks, Raouf Boutaba and Ahmed Mehaoua, in Proceedings of the IEEE Second International Workshop on Systems Management, Toronto, Ont., Canada, 19-21 June 1996.
72. Automated End-to-end Management in ATM Networks, Raouf Boutaba and Laurent Duroux, in Proceedings of IEEE International Conference on Networks & Information Engineering, (SICON/ICIE '95), Singapore, July 1995.
73. Integrated Network Management: From Concepts to Application to ATM-Based Networks, Raouf Boutaba and Simon Znaty, in Proceedings of IEEE GLOBECOM'94, SF, USA, Vol. 3, pp. 1409-1413, Nov. 1994.

74. Programs and Files Allocation Algorithm for Large Scale Distributed Systems, Raouf Boutaba and Bertil Folliot, in IFIP Transactions on Applications in Parallel and Distributed Computing, North-Holland, pp. 165-173, 1994.

75. DOMAINS: An Object-oriented Platform for Distributed Systems Management, Raouf Boutaba and Amine Benkiran, in Proceedings of Third Conference on Software Engineering and Artificial Intelligence (MIPS'94), co-sponsored by IEEE, IFIP & AFCET, Rabat, Morocco, April 1994.

76. Towards Integrated Network Management: A Domain/Policy Approach and its Application to a High Speed Multi-Network, Raouf Boutaba and Simon Znaty, in Proceedings of IEEE/IFIP Network Operation and Mnagement Symposium (NOMS'94), Florida (USA), Vol. 2, pp. 777-789, February 1994.

77. A Methodology for Structuring Management of Networked Systems, Raouf Boutaba, in IFIP Transaction on Advanced Information Processing Techniques for LAN and MAN Management, North-Holland, pp. 225-242, 1994.

78. Efficient Resource Management in Local Area Networks, Raouf Boutaba, Bertil Folliot and Pierre Sens, in IFIP Transaction on Advanced Information Processing Techniques for LAN and MAN Management, North-Holland, pp. 101-114, 1994.

79. A Directory Based Approach for Meta-Configuration, Raouf Boutaba, in International Symposium on Telecommunication Networks Operation & Management (KTIS'93), Seoul, pp. 46-52, November 1993.

80. Distributed Open Architecture for Tools Interworking, Raouf Boutaba, Karim Foughali, in European Forum for Open Systems, Technology for an Open World, Cluj-Napoca, Romania, pp.135-143, Sept. 1993.

81. Load Balancing in Local Area Networks, Raouf Boutaba and Bertil Folliot, in IFIP TRansactions on Computer Networks - Architecture and Application, North-Holland, pp. 67-78, 1993.

82. A Framework for Distributed Systems Management, Raouf Boutaba and Amine Benkiran, in IFIP TRansactions on Computer Networks - Architecture and Application, North-Holland, pp. 287-298, 1993.

83. An Architecture for the Management of Distributed Systems; Application to Intelligent Networks, Raouf Boutaba and Amine Benkiran, in 9th DNAC Conference on Intelligent Networks: Architecture, tools and applications, Paris, France, pp. 248-269, October 1992.

84. An Object Oriented Approach to Large Scale Distributed Systems Management, Raouf Boutaba, in 2nd Workshop on Objects in Large Distributed Applications with ACM OOPSLA'92, Vancouver, Oct. 1992.

85. Presentation of a Multicriteria Load Balancing, Raouf Boutaba, Bertil Folliot, in Workshop On Dynamic Object Placement and Load Balancing in Parallel and Distributed Systems held as part of the 6th European Conference on Object-Oriented Programming (ECOOP'92) , Utrecht, the Netherlands, June 1992.

THESES

86. An Architecture and Object-oriented Platform for Integrated Management of Network and Distributed Systems, Ph.D. thesis, University of Pierre & Maris Curie - Paris 6, March 1st, 1994.

87. Multicriteria Load Balancing in Heterogeneous Distributed Systems, Magister thesis, Joint Dipl. of the University of Annaba (Algeria) and the University of Glascow (Scotland), April 14th, 1993.

88. Design of a Real-time Kernel for Task Activation in Critical Industrial Environments, Dipl. Enginner, Computer Engineering Department, University of Annaba, Annaba (Algeria), July 1988.

STUDENT DOCTORAL AND MASTER'S THESES

89. Call Admission Control and Resource Management in Wireless Multimedia Networks, Youssef Iraqi, Ph.D. thesis, Computer Science Department, University of Montreal, Canada – expected 1st quarter 2001.

90. Policy-driven Management of Internet/Intranet Networks, Salima Omari, Ph.D. thesis, Computer Science Department, University of Versailles, France – expected 1st quarter 2001

91. Automated Fault Management in Wireless Telecommunication Networks, Mahamat Guiagoussou, Ph.D. thesis, Computer Science Department, University of Montreal, Canada - Expected 2001, Co-supervisor : Gregor Bochmann, Professor, University of Ottawa.

92. Design and Implementation of a Policy-based Meta-configuration system, Dioubate Defadima, Master's thesis, Computer Science Department, University of Montreal, Canada – 4th quarter 2000.

93. Virtual Network Resource Management Architecture, Walfrey Ng., Master's thesis, Electrical and Computer Engineering Department, University of Toronto, Canada – July 1999.

94. Implementation of a Web-based Management-by-delagation Architecture in Java, Adel Ghlamallah, Master's thesis, Computer Science Department, University of Montreal, Canada - 1999.

95. Implementation of a scalable multimedia server, Mingsheng Zhang, Master's thesis, Computer Science Department, McGill University, Canada, July 1998

96. Performance Evaluation of ABR and UBR Services for MPEG Video Transmission, Song Pu, Master's thesis, Computer Science Department, McGill University, Canada, July 1998

97. Transmission of MPEG2 Video Streams over ATM Best Effort Services, Ahmed Mehaoua, Ph.D. thesis, Computer Science Department, University of Versailles, France, November 1997, Co-supervisor : Guy Pujolle, Professor, University of Versailles.

98. Automatic (re-)Configuration of Networks and Distributed Systems, Petre Dini, Ph.D. thesis, Computer Science Department, University of Montreal, Canada, February 1997, Co-supervisor : Gregor Bochmann, Professor, University of Ottawa.

99. Transmission of Compressed Video over ATM networks, Mounir Lamouri, Dipl. in Engineering, Electrical Engineering Department, Ecole Polytechnique de Montréal, Canada, April 1997

100. Exploring End-to-end Management of ATM Networks, Laurent Duroux, Master's thesis, Computer Science Department, University of Versailles, France, July 1995, Co-supervisor : Guy Pujolle, Professor, University of Versailles.

101. Implementation of an Accounting Management Application for the 800 Telephone Service, Tarek Dagroub, Master's thesis, Computer Science Department, University Pierre & Marie Curie - Paris 6, September 1994, Co-supervisor : Guy Pujolle, Professor, University of Versailles.

TUTORIALS, INVITED TALKS AND PANELS

CONFERENCE TUTORIALS

1. Middleware: Concept and Future Directions, Raouf Boutaba, in New Architectures for Communications, 14th DNAC Conference, Paris, France, December 2-5, 1997.

2. Network Management: How to face emerging high-speed Network Technologies, Nazim Agoulmine and Raouf Boutaba, in New Architectures for Communications, 13th DNAC Conference, Versailles, France, December 3-5, 1996.

3. Virtual Private Networks: Design, Architectures, Planning and Management, Raouf Boutaba, submitted to IFIP/IEEE IM'01, Seattle, US, May 2001.

INVITED PRESENTATIONS AND PANEL TALKS

4. Quality-of-Service in the Internet: Reality or Hype?, Panel session in IFIP/IEEE MMNS'00, Fortaleza, Brazil, September 26, 2000.

5. Network Management in the e-commerce era, Networking Workshop held as part of CASCON'99, Toronto, Canada, November 10, 1999.
6. Automated Network Management, Network and Distributed Systems Group, University of Waterloo, Waterloo, Canada, November 3, 1999.
7. Programmable Management of Large Scale Networks, Computer Science and Telecommunications Research Institute, DePaul University, Chicago, USA, August 20, 1999.
8. Distributed Object-oriented Network Management, ECE Department, University of Western Ontario, London, Canada, May 1, 1998.
9. Network Management Programmability, Network Architecture Lab., ECE Department, University of Toronto, Toronto, Canada, April 20, 1998.
10. Trends in Integrated & Automated Management of Networks and Distributed Systems, Electrical and Computer Engineering Department, McGill University, Montreal, Canada, March 6, 1998.
11. A System Approach to Load Balancing in Distributed Multimedia Environments, School of Information Technology Engineering, Ottawa, Canada, February 28, 1998.
12. Network and Distributed Systems Management: State of the Art, Status of Standards and Open Issues, Networking Lab., ESIGETEL Engineering School, Fontainebleau, France, November 25, 1997.
13. High Availability of Multimedia Services: Application in VoD Environments, In SFBSID'97, 2nd French-Brazilian Seminar on Architectures for Distributed Systems: Multimedia architectures for telecommunications, Fortaleza-Ceara, Brazil, November 03-07, 1997.
14. Design of Enterprise Networks with Open TCP/IP Technologies, Panel session at IEEE Enterprise Networking Mini-conference (ENM'97) held as part of IEEE ICC'97, Montreal, Canada, June 12-15, 1997.
15. QoS Management in Video-on-Demand Environments, In GRES'97 Int. Conference on Networks and Services Management, Rennes, France September, 1997.
16. Intelligent Management of Mobile Wireless Networks, Electrical and Computer Engineering Department, Concordia University, June 26, 1997.
17. Toward Intelligent Management of Mobile Cellular Networks, In MWCN'97, First International Workshop on Mobile and Wireless Communications Networks, Jointly sponsored by ACM, IFIP and IEEE, Paris, France, May 12-14, 1997.
18. Intelligent Management System for Fault Diagnostic in Cellular Telecommunication Networks, In IEEE ICT'97 Int. Conference on Telecommunications, Melbourne, Australia, April 2-4, 1997.
19. Toward Integrated and Automated Management of Network and Distributed Systems, Computer Science Department, University of Montreal, Montreal, Canada, November 20, 1996.
20. Distributed Systems and Applications Management: A Need for Integration and Automation, In COMDEX'97, Montreal, October 8-9, 1996.
21. Network Management versus Traffic Control in ATM Networks, PRiSM Lab. University of Versailles, France, February 15th, 1995.

PROFESSIONAL ACTIVITIES

INTERNATIONAL JOURNALS

- Member of Editorial Board, International Journal of Network and Systems Management
- Guest editor with Alberto Leon-Garcia, Special issue on the Management of Multimedia Networks and Services, International Journal of Network and Systems Management (JNSM) , Plenum Press, NY, Vol.8, N° 1, March 2000.

- Guest editor with Jean-Pierre Claude, Special Issue on QoS Management in Multimedia Networks, International Journal on Interoperable Communication Networks, Baltzer Science Publishers & ACTS, Vol.2, N° 4, January 2000.
- Guest editor with Joakim Kalvenes and Guy Pujolle, Special Issue on Resource Management in Wireless Networks, Mobile Networks and Applications Journal (MONET), ACM/Baltzer Science Publishers, Vol.4, N° 2, May 1999.

COMMITTEES, CONFERENCE AND WORKSHOP ORGANIZATION

- Founder and General Chair, First IFIP/IEEE Conference on Management of Multimedia Networks and Services (MMNS'97), Montreal (Canada), 1997
- Technical Program Committee co-chair, IFIP/IEEE International Conference on Management of Multimedia Networks and Services' 00 (MMNS'00), Fortaleza (Brazil), 2000
- Technical Program Committee co-chair and co-organizer, Mini-conference on Active & Programmable Networks, held as part of IFIP Networking 2000 conference, Paris (France), 2000.
- Technical Program Committee co-chair, IFIP/IEEE International Conference on Management of Multimedia Networks and Services' 98 (MMNS'98), Versailles (France), 1998
- Technical Program Committee co-chair, 4th IEEE Workshop on Feature Interactions in Telecommunication Networks'97 (FIW'97), Montreal (Canada), 1997.
- Special Events Chair, IFIP/IEEE International Symposium on Integrated Management (IM'01), Seattle (USA), 2001
- Publicity Chair, IFIP Networking 2000, Paris (France), 2000
- Session Chair (Fault Management), IFIP/IEEE International Workshop on Distributed Systems Operation and Management (DSOM'00), Austin (USA), 2000
- Session Chair (Active Networks), IEEE/IFIP International Symposium on Network Operation and Management (NOMS'00), Hawaii (USA), 2000
- Session Chair (Active Networks), IFIP/IEEE International Workshop on Distributed Systems Operation and Management (DSOM'99), Zurich (Switzerland), 1999
- Session Organizer and Chair (Multimedia Networks Management), IEEE International Conference on Telecommunications (ICT'98), Chalkidiki (Greece), 1998
- Session Chair (Service Management), International Conference on Computer Communications (ICCC'97), Cannes (France), 1997
- Session Chair (Network Management), Colloque Francophone sur l'Ingenierie des Protocoles (CFIP'96), Rabat (Morocco), 1996

- Technical Program Committee Member of :
  - Quality of Service over Next Generation Data Networks conference to be held as part of the SPIE ITCom Symposium, Denver, 20-24 August 2001.
  - IEEE Next Generation Internet Symposium (NGI'01) held as part of ICC'01, Helsinki (Finland), 2001
  - IFIP/IEEE International Symposium on Integrated Management (IM'01), Seattle (USA), 2001
  - IEEE Symposium on Computers and Communications (ISCC'01), Hammamet (Tunisia), 2001

- International Workshop on Mobile Agents for Telecommunication Applications (MATA'00), Paris (France), 2000
- IFIP/IEEE International Workshop on Distributed Systems Operation and Management (DSOM'00), Austin (USA), 2000
- IEEE/IFIP International Symposium on Network Operation and Management (NOMS'00), Hawaii (USA), 2000
- ACM International Conference on Software Engineering Applied to Networking and Parallel/ Distributed Computing (SNPD'00), Reims (France), 2000
- 14th De Nouvelles Architecture pour les Communications (DNAC'00), Paris (France), 2000
- IFIP/IEEE International Workshop on Distributed Systems Operation and Management (DSOM'99), Zurich (Switzerland), 1999
- International Workshop on Mobile Agents for Telecommunication Applications (MATA'99), Ottawa (Canada), 1999
- 13th De Nouvelles Architecture pour les Communications (DNAC'99), Paris (France), 1999
- IEEE International Conference on Telecommunications (ICT'98), Chalkidiki (Greece), 1998
- 12th De Nouvelles Architecture pour les Communications (DNAC'98), Paris (France), 1998
- IEEE International Conference on Computer Communications (ICCC'97), Cannes (France), 1997
- 11th De Nouvelles Architecture pour les Communications (DNAC'97), Paris (France), 1997

- Reviewing activities
  - Research proposals for the Natural Sciences & Engineering Research Council of Canada
  - Book for IEEE Press (1996)
  - A number of papers submitted to international conferences and international journals.

MEMBERSHIP IN PROFESSIONAL ASSOCIATIONS:

- Member of IFIP (International Federation of Information Processing) – TC6 (Technical Committee on Communication Systems) – WG6.6 (Working Group on Network Management).
- Member of IEEE (Institute of Electrical and Electronics Engineers) – COMSOC (Communications Society) and CNOM (Committee on Network Operation and Management).
- Member of the ACM (Association for Computing Machinery) – SIGCOMM (Special Interest Group on Data Communications) and SIGMOBILE (Special Interest Group on Mobile Computing and Communications).
- Member of the Canadian Mathematics Society

OTHER CONTRIBUTIONS

MASTER'S AND DOCTORAL THESIS (EXTERNAL) EXAMINER

- For Ph.D. thesis by Vincent Huang, ECE Department, University of Waterloo, 2000
- For Ph.D. thesis by Liang Xu, ECE Department, University of Waterloo, 2000
- For Ph.D. thesis by Andrei Dragoi, ECE Department, University of Waterloo
- For Mmath thesis by Biswaroop Mukherjee, CS Department, University of Waterloo, 2000
- For Mmath thesis by Frank G. Lin, CS Department, University of Waterloo, 2000

- For Mmath thesis by Ambles W.K. Kock, CS department, University of Waterloo, 2000
- For Ph.D. thesis by Lian Zhao, ECE Department, University of Waterloo, 2000
- For Ph.D. thesis by F. Nait, University of Versailles, France, 1999
- For Ph.D. thesis by H. Labiod, University of Versailles, France, 1998
- For Ph.D. thesis by S. Cherkaoui, University of Sherbrooke, 1998
- For Magister thesis by N. Kimour, University of Annaba, Algeria, 1994

TEACHING

RECENT TEACHING

Date	Organization	Area	Level
Fall 2000	Computer Science Department University of Waterloo	Computer Networks (CS454)	Undergrad. (4th Year)
Spring 2000	Computer Science Department University of Waterloo	Computer Networks (CS454)	Undergrad. (4th Year)
Winter 1999	Electrical & Computer Engineering University of Toronto	Algorithms and Data Structure (ECE242S)	Undergrad. (2nd Year)
	Electrical & Computer Engineering University of Toronto	Computer Networks (ECE361S)	Undergrad. (2nd Year)
Fall 1998	Electrical & Computer Engineering Univ. of Toronto	Programming Languages. (CSC326F)	Undergrad. (3rd Year)
	Master's of Engineering in Telecom University of Toronto/Nortel Institute	Network Management	Graduate

PREVIOUS TEACHING

Date	Organization	Areas	Level
1994-95	University of Evry	Networks	Undergrad.
	Versailles University	Networks	Undergrad.
	Orsay University (Paris 11)	Networks	Undergrad.
1993-94	University of Evry	Networks	Undergrad.
	University of Evry	Networks	Undergrad.
	University of Evry	Operating systems	Undergrad.
	University of Evry	Computer Office	Undergrad.
1991-92	P&M. Curie Univ. (Paris 6)	Networks	Undergrad.
	ESIEA Engineer's school	Numerical Analysis	Undergrad.
	ESIEA Engineer's school	Programming in Pascal	Undergrad.
1990-91	Sorbonne University (Paris 4)	Computer basics	Undergrad.
	ESIEA Engineer's school	Pascal Programming	Undergrad.