

Research Activity Overview

Leonardo Badia

Leonardo Badia

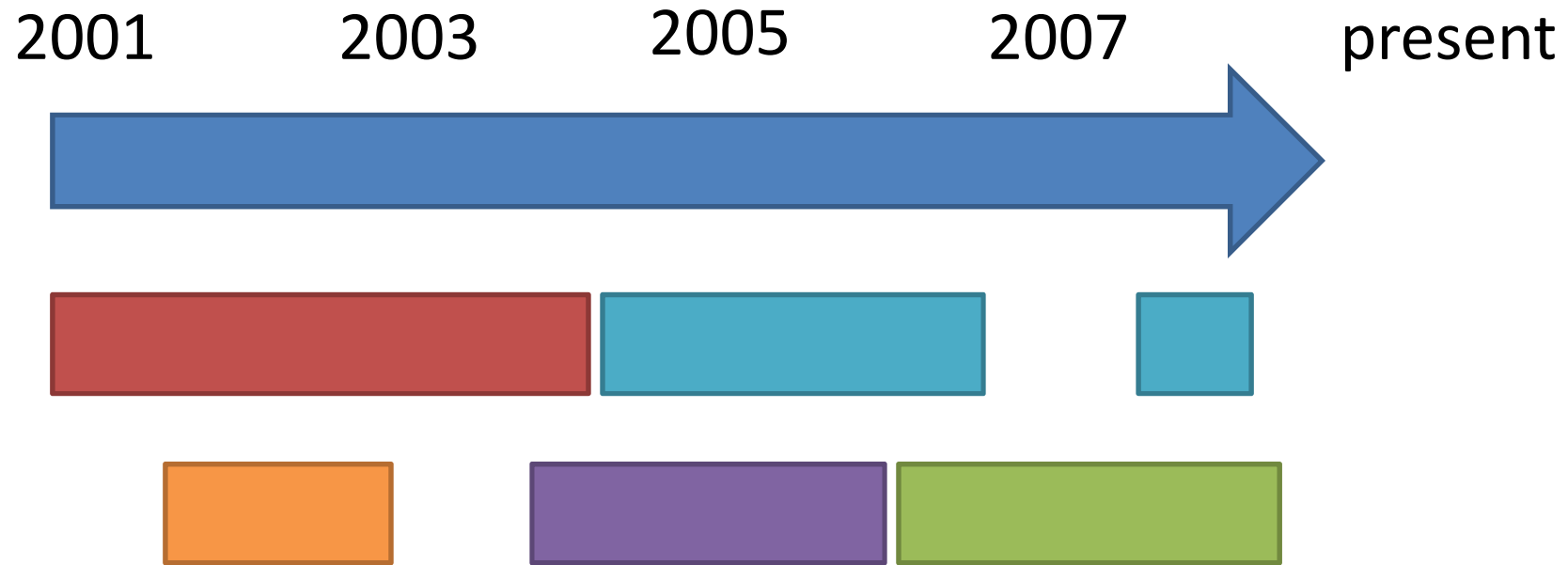
Place and date of birth:

Ferrara, Italy, on May 22, 1977.

Education:

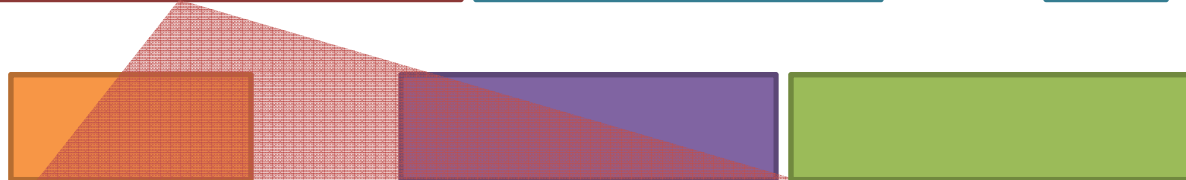
Laurea (MS equivalent) in Electrical Engineering and PhD in Information Engineering (both with honors) from the University of Ferrara, Italy, in 2000 and 2004, respectively.

Research activity time-chart



Research activity time-chart

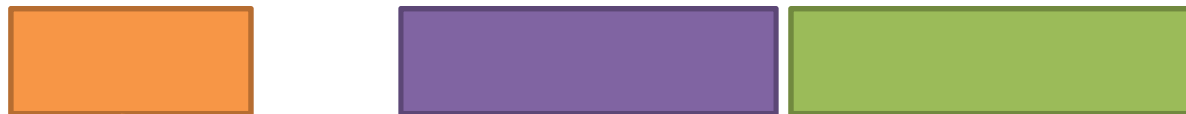
2001 2003 2005 2007 present



Jan 2001 – Mar 2004: PhD student and Assistant Lecturer, University of Ferrara, Italy

Research activity time-chart

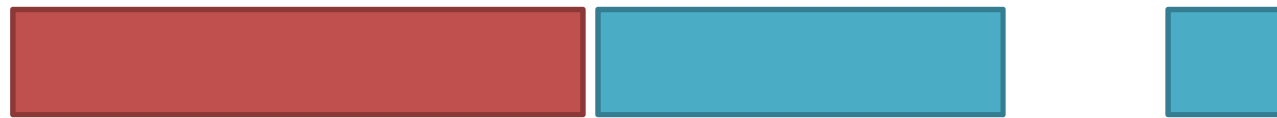
2001 2003 2005 2007 present



Sep 2002 – Mar 2003: Visiting Researcher,
Royal Institute of Technology (KTH), Sweden

Research activity time-chart

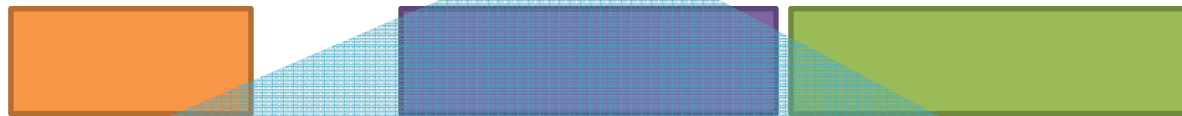
2001 2003 2005 2007 present



Jan 2004 – May 2006: Project Manager,
Consorzio Ferrara Ricerche, Italy

Research activity time-chart

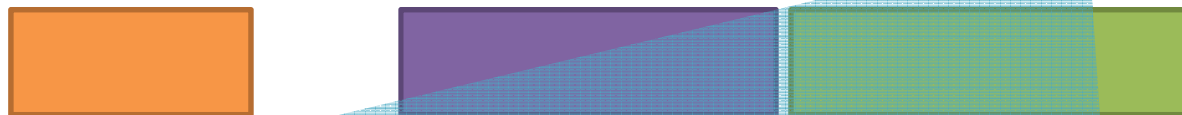
2001 2003 2005 2007 present



Mar 2004 – Sep 2006: Lecturer, University of Ferrara, Italy

Research activity time-chart

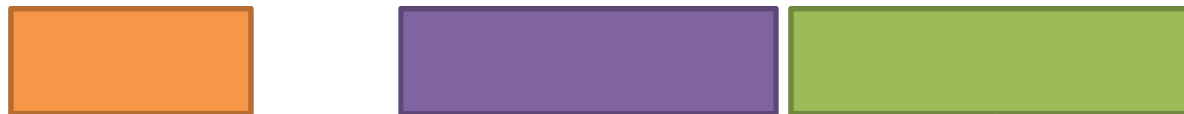
2001 2003 2005 2007 present



May 2008: Assistant Lecturer, University of Ferrara, Italy

Research activity time-chart

2001 2003 2005 2007 present



May 2006 – present: Assistant Professor CSE,
IMT Lucca, Italy

Research themes

- Multi-hop wireless networks
 - Wireless Mesh Networks
 - Resource Management over Time (and Frequency)
 - Models of wireless interference
- (Hybrid) Automatic Repeat reQuest
 - Markov models of ARQ
 - Markov models of HARQ
 - Wireless channel models for ARQ techniques

Research themes

- Radio Resource Management
 - Game-theoretic and Economic-based RRM
 - Genetic Algorithms applied to RRM
 - RRM for Wideband Code-Division Multiple Access
- Integration of heterogeneous networks
 - Clustering and cooperation of mobile devices
 - UMTS / WLAN convergence
 - 4G Networks

Open collaborations

- University of Pisa, Italy, prof. Luciano Lenzini
- University of Padova, Italy, prof. Michele Zorzi
- Royal Institute of Technology (KTH), Sweden, prof. Jens Zander
- Aalborg University, Denmark, prof. Frank Fitzek

Other professional activities

- IEEE and ACM member
- Reviewer of research articles for several major scientific journals and conferences
- TPC member, Publicity Committee member and Local Organizer for many scientific conferences and research events
- Active participation (Session Chair, Presenter) to more than 40 scientific conferences

Publications

- At June 2008, I published 20 journal papers (6 of which are to appear), 45 conference papers, and 3 books or book chapters.
- According to scholar.google, my citation indices are as follows:
 - h-index 9; g-index 12.

(h-index= X means X of your papers have more than X citations each)

(g-index= X means X of your papers have more than X^2 citations on aggregate)

Publication list

black entries are conferences, [blue entries are journals](#), [green entries are books or book chapters](#)

1. **L. Badia**, M. Zorzi, A. Gazzini, "On the impact of user mobility on call admission control in WCDMA systems," Proc. IEEE VTC 2002 Fall, Vancouver, BC, Canada, September 2002.
2. **L. Badia**, M. Zorzi, "On the construction of broadcast and multicast trees in wireless networks: Global vs. local energy efficiency," Proc. IEEE Globecom 2002, Taipei, ROC, November 2002.
3. M. Rossi, **L. Badia**, M. Zorzi, "Accurate approximation of ARQ packet delay statistics over Markov channels with finite round-trip delay," Proc. IEEE WCNC 2003, New Orleans (LO), USA, March 2003.
4. M. Rossi, **L. Badia**, M. Zorzi, "On the delay statistics of an aggregate of SR-ARQ packets over Markov channels with finite round-trip delay," Proc. IEEE WCNC 2003, New Orleans (LO), USA, March 2003.
5. **L. Badia**, M. Zorzi, "A framework for call admission control threshold setup and evaluation of the performance in WCDMA systems," Proc. IEEE VTC Spring 2003, Seogwipo, Korea, Apr. 2003.
6. **L. Badia**, M. Zorzi, S. Fini, "On the estimation of user mobility for improved admission control algorithms in WCDMA systems," Proc. IEEE VTC Spring 2003, Seogwipo, Korea, April 2003.
7. **L. Badia**, M. Zorzi, A. Gazzini, "A model for threshold comparison call admission control in third generation cellular systems," Proceedings IEEE ICC'03, Anchorage (AK), USA, May 2003.

Publication list

8. F. Fitzek, **L. Badia**, M. Zorzi, G. Schulte, P. Seeling, T. Henderson, "Mobility and stability evaluation in wireless multi-hop networks using multiplayer games," Proc. ACM NetGames 2003, San Francisco (CA), USA, May 2003.
9. **L. Badia**, M. Lindström, J. Zander, M. Zorzi, "An economic model for the radio resource management in multimedia wireless systems," Proc. IEEE ASWN 2003, Bern, Swiss, July 2003.
10. **L. Badia**, M. Boaretto, M. Zorzi, "A users' satisfaction driven scheduling strategy for wireless multimedia QoS," Proc. QoFIS 2003, Stockholm, Sweden, October 2003.
11. F. Fitzek, M. Munari, V. Pastesini, S. Rossi, **L. Badia**, "Security and authentication concepts for UMTS/WLAN convergence," Proc. IEEE VTC Fall 2003, Orlando (FL), USA, October 2003.
12. M. Rossi, **L. Badia**, M. Zorzi, "Exact statistics of ARQ packet delivery delay over Markov channels with finite round-trip delay," Proc. IEEE Globecom 2003, San Francisco (CA), USA, December 2003.
13. **L. Badia**, M. Lindström, J. Zander, M. Zorzi, "Demand and pricing effects on the radio resource allocation of multimedia communication system," Proc. IEEE Globecom 2003, San Francisco (CA), USA, December 2003.
14. **L. Badia**, M. Boaretto, M. Zorzi, "Neural self-organization for the packet scheduling in wireless networks," Proc. IEEE WCNC 2004, Atlanta (GA), USA, March 2004.

Publication list

15. **L. Badia**, M. Lindström, J. Zander, M. Zorzi, “An economic model for the radio resource management in multimedia wireless systems,” Elsevier’s Computer Communications, Volume 27, pp. 1056–1064, April 2004.
16. **L. Badia**, M. Zorzi, “An analysis of multimedia services in next generation communication systems with QoS and revenue management,” Proc. IEEE VTC Spring 2004, Milan, Italy, May 2004.
17. **L. Badia**, M. Zorzi, “On the radio resource pricing for wireless LAN hot-spots,” Proc. WPMC 2004, Abano Terme (PD), Italy, September 2004.
18. **L. Badia**, M. Zorzi, “On utility-based radio resource management with and without service guarantees,” Proc. ACM/IEEE MSWiM’04, Venezia, Italy, October 2004.
19. M. Rossi, **L. Badia**, M. Zorzi, “SR-ARQ delay statistics on N-state Markov channels with finite round trip delay,” Proc. IEEE Globecom 2004, Dallas (TX), USA, December 2004.
20. **L. Badia**, M. Zorzi, “A technical and micro-economic analysis of wireless LANs,” Proc. IEEE WCNC 2005, New Orleans (LO), USA, March 2005.
21. **L. Badia**, C. Saturni, L. Brunetta, M. Zorzi, “An optimization framework for radio resource management based on utility vs. price tradeoff in WCDMA systems,” Proc. IEEE WiOpt’05, Riva del Garda (TN), Italy, April 2005.

Publication list

22. **L. Badia**, C. Bellettini, M. Zorzi, “A radio resource management scheme driven by users’ preferences under the CSMA/CA capacity constraint,” Proc. IEEE VTC Spring 2005, Stockholm, Sweden, May 2005.
23. M. Lindström, **L. Badia**, J. Zander, M. Zorzi, “Speculative resource allocation for packet-switched wireless networks,” Proc. IEEE VTC Spring 2005, Stockholm, Sweden, May 2005.
24. M. Rossi, **L. Badia**, P. Giacomini, M. Zorzi, “On the effectiveness of logical device aggregation in multi-radio multi-hop networks,” **Best Paper Award**, Proc. IEEE MobiWac 2005, Maui (HW), USA, June 2005.
25. **L. Badia**, D. Mari. *MatES - Esercizi di matematica per l’elaborazione dei segnali, 116 pages (in italian)*, ISBN 88-371-1564-4, ed. Pitagora, Bologna, June 2005.
26. M. Rossi, **L. Badia**, M. Zorzi, “On the delay statistics of SR ARQ over Markov channels with finite round-trip delay,” IEEE Transactions on Wireless Communications, July 2005.
27. **L. Badia**, M. Zorzi, “Radio resource management with utility and pricing for wireless LAN hot-spots,” Kluwer’s Wireless Personal Communication Journal – Special Issue on Advances on Wireless LANs and PANs, July 2005.
28. **L. Badia**, M. Zorzi, “Scheduling for wireless networks with users’ satisfaction and revenue management,” Proc. ISAS CITSA 2005, Orlando (FL), USA, July 2005 (**invited paper**).

Publication list

29. **L. Badia**, M. Rossi, M. Zorzi, "On the statistics of delay terms in SR ARQ on Markov channels," Proc. IEEE ISWCS '05, Siena, Italy, September 2005.
30. F. Berggren, A. Bria, **L. Badia**, I. Karla, R. Litjens, P. Magnusson, F. Meago, H. Tang, R. Veronesi, "Multi-radio resource management for Ambient Networks," Proc. IEEE PIMRC 2005, Berlin (Germany), September 2005.
31. **L. Badia**, C. Taddia, G. Mazzini, M. Zorzi, "Multi-radio resource allocation strategies for heterogeneous wireless networks," Proc. WPMC 2005, Aalborg (Denmark), September 2005.
32. **L. Badia**, D. Guerra, M. Zorzi, "Micro-economic strategies for the radio resource management of heterogeneous access techniques," Proc. WPMC 2005, Aalborg, Denmark, September 2005.
33. M. Rossi, **L. Badia**, N. Bui, M. Zorzi, "On group mobility patterns and their exploitation to logically aggregate terminals in wireless networks," Proc. IEEE VTC Fall 2005, Dallas (TX), USA, September 2005.
34. **L. Badia**, M. Rossi, M. Zorzi, "Queueing and delivery analysis of SR ARQ on Markov channels with non-instantaneous feedback," Proc. IEEE Globecom, St.Louis (MO), USA, December 2005.
35. **L. Badia**, M. Zorzi, "An approach to wireless scheduling considering revenue and users satisfaction," [The Mediterranean Journal of Computers and Networks \(MEDJCN\)](#), January 2006.

Publication list

36. **L. Badia**, S. Merlin, A. Zanella, M. Zorzi, "Pricing VoWLAN services through a micro-economic framework," IEEE Wireless Communications Magazine, February 2006.
37. **L. Badia**, M. Rossi, M. Zorzi, "Delay statistics of SR ARQ on Markov channels in the presence of variable packet arrival rate," IEEE Transactions on Wireless Communications, April 2006.
38. **L. Badia**, A. Telesca, M. Zorzi, "On the network utility optimal allocation of radio resources in WCDMA systems," IEEE Communications Letters, May 2006.
39. G. Fodor, M. Telék, **L. Badia**, "On the tradeoff between blocking and dropping probabilities in CDMA networks supporting elastic services," Proc. IFIP NETWORKING, Coimbra, Portugal, May 2006.
40. M. Rossi, **L. Badia**, M. Zorzi, "SR-ARQ delay statistics on N-StateMarkov channels with finite round trip delay," IEEE Transactions on Wireless Communications, June 2006.
41. **L. Badia**, N. Bui, M. Miozzo, M. Rossi, M. Zorzi, "On the exploitation of user aggregation strategies in heterogeneous wireless networks," **Best Paper Award**, Proc. IEEE CAMAD 2006, Trento, Italy, June 2006.
42. **L. Badia**, F. Rodaro, M. Zorzi, "A joint technical and micro-economic investigation of pricing data services over wireless LANs," Proc. IEEE IWCMC 2006, Vancouver (BC), Canada, July 2006.

Publication list

43. **L. Badia**, E. Fasolo, A. Paganini, M. Zorzi, “Data aggregation algorithms for sensor networks with geographic information awareness,” Proc. WPMC 2006, San Diego (CA), USA, Sept. 2006.
44. S. Merlin, S. Begnini, A. Zanella, **L. Badia**, M. Zorzi, “QoS-aware distributed resource allocation for hybrid FDMA/TDMA multicellular networks,” Proc. WPMC 2006, San Diego (CA), USA, Sept. 2006.
45. **L. Badia**, M. Mastrogiovanni, C. Petrioli, S. Stefanakos, M. Zorzi, “An optimization framework for joint sensor deployment, link scheduling and routing in underwater sensor networks,” Proc. ACM WUWNet’06 (ACM Mobicom 2006 Symposium on Wireless Underwater Networks), Los Angeles (CA), USA, September 2006.
46. **L. Badia**, N. Bui, “A group mobility model based on nodes’ attraction for next generation wireless networks,” Proc. IEE Mobility 2006, Bangkok, Thailand, October 2006.
47. R. Agüero Calvo, M. Miozzo, D. Hollós, E. Hepworth, J. Eisl, **L. Badia**, “Routing groups in Ambient Networking,” Proc. IEE Mobility 2006, Bangkok, Thailand, October 2006.
48. **L. Badia**, M. Levorato, M. Zorzi, “Analytical investigation with Markov models of selective repeat type II hybrid ARQ,” Proc. IEEE Globecom 2006, October 2006.
49. **L. Badia**, M. Zorzi, “[Dynamic utility and price based radio resourcemanagement for rate adaptive traffic](#),” [ACM/Baltzer/Wiley Wireless Networks](#), January 2007 (publication date as “on-line first”).

Publication list

50. **L. Badia**, M. Miozzo, M. Rossi, M. Zorzi, "Routing schemes in heterogeneous wireless networks based on access advertisement and backward utilities for QoS support," IEEE Communications Magazine, February 2007.
51. **L. Badia**, A. Baiocchi, S. Merlin, S. Pupolin, A. Todini, A. Zanella, M. Zorzi, "On the impact of physical layer awareness on scheduling and resource allocation in broadband multi-cellular IEEE 802.16 systems," IEEE Wireless Communications Magazine, February 2007.
52. **L. Badia**, A. Botta, L. Lenzini, "Joint routing and link scheduling for wireless mesh networks through genetic algorithms," Proc. IEEE WiOpt 2007, Limassol, Cyprus, April 2007.
53. D. Bacciu, **L. Badia**, A. Botta, "Fuzzy agreement for network service contracts," Proc. CIEF, Salt Lake City (UT), USA, July 2007.
54. **L. Badia**, M. Levorato, M. Zorzi "An improved channel quantization method for performance evaluation of incremental redundancy HARQ based on reliable channel regions," Proc. Allerton Conference, Monticello (IL), USA, September 2007.
55. **L. Badia**, M. Mastrogiovanni, C. Petrioli, S. Stefanakos, M. Zorzi, "An optimization framework for joint sensor deployment, link scheduling and routing in underwater sensor networks," ACM Mobile Computing and Communication Review (MC2R), October 2007.
56. **L. Badia**, A. Erta, L. Lenzini, M. Zorzi. Scheduling, Routing, and Related Cross- Layer Management through Link Activation Procedures in Wireless Mesh Networks, 38 pp, in: E. Hossain, K. Leung. Wireless Mesh Networks: Models, Architectures, Protocols. Springer-Verlag, 2007.

Publication list

57. **L. Badia**, N. Bui, M. Miozzo, M. Rossi, M. Zorzi “Mobility-aided routing in multihop heterogeneous networks with group mobility,” **Best Paper Award of the Wireless Networks Symposium**, Proc. IEEE Globecom, Washington (DC), USA, November 2007.
58. D. Bacciu, A. Botta, **L. Badia**, “Fuzzy Admission Control with Similarity Evaluation for VoWLAN with QoS Support,” Proc. IEEE/IFIP WONS, Garmisch- Partenkirchen, Germany, January 2008.
59. **L. Badia**, A. Erta, L. Lenzini, M. Zorzi, “A general framework of interference models for joint routing and link scheduling in wireless mesh networks,” IEEE Network, January–February 2008.
60. M. Rossi, **L. Badia**, P. Giacomini, M. Zorzi, “Energy and connectivity performance of routing groups in multi-radio multi-hop networks,” Wiley’s Wireless Communications and Mobile Computing (WCMC) Journal, special issue on Mobility Management and Wireless Access, March 2008.
61. M. Levorato, **L. Badia**, M. Zorzi, “Efficient Quantization for Feedback Controlled Networks with Type II Hybrid ARQ,” Proceedings IEEE/ICST RAWNET, Berlin, Germany, April 2008.
62. **L. Badia**, M. Levorato, M. Zorzi, “Markov analysis of selective repeat type II hybrid ARQ using block codes,” IEEE Transactions on Communications, September 2008.
63. L. Badia, A. Erta, L. Lenzini, F. Rossetto, M. Zorzi, “A Physical Model Scheduler for Multi-Hop Wireless Networks Based on Local Information,” Proceedings IEEE MASS, Atlanta (GA), USA, September 2008.}

Publication list

64. **L. Badia**, S. Merlin, M. Zorzi “Resource management in IEEE 802.11 multiple access networks with price-based service provisioning,” IEEE Transactions on Wireless Communications.
65. **L. Badia**, N. Bui, M. Miozzo, M. Rossi, M. Zorzi “Improved resource management with user aggregation in heterogeneous multiple access wireless networks,” IEEE Transactions on Wireless Communications.
66. **L. Badia**, A. Botta, L. Lenzini, “A genetic approach to joint routing and link scheduling for wireless mesh networks,” Elsevier Ad Hoc Network Journal, special issue on Bio-Inspired Computing.
67. **L. Badia**, “On the Impact of Correlated Arrivals and Errors on ARQ Delay Terms,” IEEE Transactions on Communications.
68. **L. Badia**, M. Conti, S. K. Das, L. Lenzini, H. Skalli, Routing, Interface Assignment and Related Cross-layer Issues in Multi-radio Wireless Mesh Networks. Springer.

+ other 6 publications currently under review