

Ian R. Marsh

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RESEARCH & EXPERIENCE

Post doctoral researcher
Network and Information Processing Group

Faculty of Engineering, University of Porto
Portugal
June 2009 - present

From summer 2009 I started a postdoctoral position at the University of Porto. My time was divided between the Network and Information Processing Group (NIP) [Prof. Barros] and the group of Optimal Control [Prof. Rosario Pinho]. My work, split into two 9 month periods, was i) network coding for information dissemination and ii) modelling information exchange in vehicular networks using traffic flow models for VANETs. Currently I hold an FCT grant for 3 years of post-doctoral research.

RESEARCH & EXPERIENCE

Researcher
Communication Networks and Systems Lab.

Swedish Institute of Computer Science
Sweden
November 1995 - June 2009

2007-2009: I worked within the EU 7th Integrated Project 4WARD. The largest IST project with 40 partners & a 24M Euro budget. The aim is to design new key Internet primitives for the next decade. I worked on data dissemination and evaluated the performance of several approaches against 3rd and 4th generation retrieval. I wrote a whole system simulator including TCP flow control for evaluation.

2005-2007: In the 6th framework program, I worked within an IP called *Ambient Networks*. The basic idea was that networks could “compose” allowing two or more initially separated networks to appear as one to the user. I assessed the role of using Forward Error Control (FEC) within the TCP protocol. The idea was to try and serve sessions until completion once admitted to the Ambient network by performing Reed-Solomon correction at the packet level. I also was the local representative of a Network of Excellence (NoE) called E-NEXT. The project was very successful with vibrant exchanges of students, workshops, books and a conference that attracts high quality work today (CoNEXT). My technical contribution was a repository of VoIP measurements which is still the largest publicly available data set.

2001-2005: During this time I performed the bulk of my research for my PhD which involved publishing nine papers as well as performing 1 year of course work. The topic of my research was real-time voice, from theoretical studies of call multiplexing to implementations of our own application Sicsophone as well user evaluations of speech quality. A doctoral degree in Sweden often

includes an intermediate step, called a licentiate, which was also done in this time (including a thesis and public defense).

1997-2001: Two assignments with local industry included a Ericsson-financed project looking at Weighted Fair Queuing (WFQ) algorithms. I studied and implemented a number of solutions for Ericsson research. I also investigated the TCP protocol over a network technology that could vary its capacity called dynamic synchronous transfer mode (DTM). With two independent rate regulating mechanisms, it is nontrivial to design a flow control scheme that allocates capacity for flows optimally.

1995-1997: I worked on the design of a multicast-based file system, JetFile, with three colleagues with sponsorship from HP labs, UK. JetFile was a fully working distributed file system, based on scalable reliable multicast (SRM) whose results were published in 1996.

RESEARCH & EXPERIENCE

Researcher
Networking Group

**IBM European Networking Center,
Germany
January 1993 - June 1995**

1992-1995: Worked on a videoconferencing system for a large German bank as part of an EU 4th framework program. The software used a prerunner to the streaming protocol ST-II (IP protocol number 5). Worked on caching extensions to the Andrew File System (AFS), acquired by IBM. Six weeks finalising a Video-on-Demand (VoD) system at IBM Washington D.C, USA for deployment in 4000 homes in Hong Kong.

RESEARCH & EXPERIENCE

Guest Scientist
Mathematics and statistics department

**Commonwealth & Scientific
Research Organisation
Australia
December 1990 - December 1992**

Co-wrote a user interface for the Bell Labs statistical language, S, it is popular as the public domain mathematical package, R currently.

RESEARCH & EXPERIENCE

Engineer
Graphics and image processing lab.

**3D Labs, UK
September 1989 - December 1990**

Worked on graphics and image processing microcode primitives for a single CPU graphics processor and later for a multiple core CPU (SIMD) processor.

FCT Scholarship holder
Porto Portugal

Courses

- Analysis I and II
- Linear algebra
- Optimisation by Vector Space Methods
- Measure Theory and Stochastic Processes

External PhD student
KTH Stockholm, Sweden

2000-2009: Enrolled late 2000 as a doctoral student at the Royal Institute of Technology, Stockholm under the guidance of Professor Gunnar Karlsson. The graduate school was the Graduate School of Telecommunications <http://www.s3.kth.se/gradedu/GST>. The title of my thesis was "Quality aspects of Internet telephony". The opponent for my Ph.D thesis was Professor Henning Schulzrinne of Columbia university, USA, the accepted expert of IP-based voice services (developer of SIP, RTSP, RTP). During my PhD I supervised six masters students and taught two courses in systems design and Internetworking. I took over 20 courses including probability theory, convex optimisation, game theory, simulation, modelling of broadband communication systems, information theory, estimation and channel modelling to highlight the quality of the education I received.

Courses (ECTS)

- Stochastic traffic modelling (7.5)
- Wireless Multiple Access protocols (6.0)
- Summer school on intellectual Property rights (3.0)
- Probability theory and distributed system (6.0)
- Stochastic problems in simulation (6.0)
- Communication systems (15)
- Performance evaluation of systems (6.0)
- Internetworking (6.0)

Not examined

- Information theory and channel coding
- Machine Learning
- Game theory
- Distributed systems

Masters student
Manchester University
Manchester, UK 1988

Masters Degree in System Design. Project in studying non-harmonic partials of musical instruments and implementation thereon in a polyphonic synthesiser.

Courses

- VLSI
- Artificial Intelligence
- Graphics and Image Processing
- Parallelism in software
- Communication systems

Undergraduate student
Manchester Polytechnic
Manchester, UK 1987

Bachelor Degree (Hons) in Physics and Computer Science. Upper second class honours degree.
Project in colour science education

SELECTED PUBLICATIONS

- B. Ahlgren, M. D'Ambrosio, C. Dannewitz, M. Marchisio, I. Marsh, B. Ohlman, K. Pentikousis, R. Rembarz, O. Strandberg, V. Vercellone "Considerations for a Network of Information", *ReArch*, 2008.
- W. Leister, T. Sutinen, S. Boudko, I. Marsh, C. Griwodz and P. Halvorsen "An architecture for adaptive multimedia streaming to mobile nodes", *The 6th International Conference on Advances in Mobile Computing and Multimedia*, 2008.
- M. Varela, I. Marsh and B. Grönvall "A Systematic Study of PESQ's Performance (from a Networking Perspective)", *In Proceedings of MESAQIN '06*, 2006.
- I. Marsh, B. Grönvall and F. Hammer "The design and implementation of a quality-based handover trigger", *5th IFIP-TC6 Networking*, 2006.
- I. Marsh, J. C. M. Severiano, V. Y. D. Nunes and G. Q. Maguire Jr "IEEE 802.11b voice quality assessment using cross-layer information", *1st Workshop on Multimedia over Wireless*, 2006.
- O. Hagsand, I. Más, I. Marsh and G. Karlsson, "Self-admission control for IP telephony using early quality estimation", *IFIP Networking*, 2004.
- I. Marsh, F. Li and G. Karlsson, "Wide Area Measurements of VoIP Quality", *Quality of Future Internet Services*, 2003.
- O. Hagsand, I. Marsh and K. Hanson, "Sicsophone: A Low-delay Internet Telephony Tool" *IEEE 29th Euromicro Conference*, 2003.
- I. Kaj and I. Marsh, "Modelling the Arrival Process for Packet Audio," *Quality of Service in Multiservice IP Networks*, 2003.
- H. Abrahamsson, O. Hagsand and I. Marsh, "TCP over Variable Capacity Links: A Simulation Study," *7th IFIP/IEEE International Workshop on Protocols for High Speed Networks*, 2002.
- B. Ahlgren, A. Andersson, O. Hagsand and I. Marsh, "Dimensioning Links for IP Telephony", *1st Internet Telephony Workshop*, 2001.
- I. Marsh. Measuring Internet Telephony Quality: Where are we today? *IEEE Globecom*, 1999.
- B. Grönvall, S. Pink, I. Marsh. JetFile: a multicast based file system for the Internet *SIGOPS* 1996.

ADVISORY ROLES, TEACHING EXPERIENCE

- Evaluator of a multimedia course 2007 (University of Oslo)
- Supervised five masters students (2001-2006)
- Supervised six undergraduates in a systems design course at KTH
- Main contact point for Ph.D students whilst at SICS
- Main reviewer for Addison Wesley's IP telephony books
- Reviewed over 50 articles for conferences and journals
- Member of IEEE Comsoc and Information theory societies

BOOK CONTRIBUTION I. Marsh, F. Li and G. Karlsson, "Wide Area Measurements of VoIP Quality" *Final Report of the COST 263 European Action on Quality of Future Internet Services*, Chapter 1, September 2003.

PROGRAM COMMITTEES

- Special Session on "QoS, Reliability and Performance Modelling" Graz, Austria, July 2008, editors: Hind Castel and Periklis Chatzimisios.
- Thirteenth Annual Multimedia Computing and Networking (MMCN'06), editors, S. Chandra and C. Griwodz.
- Next Generation Teletraffic and Wired/Wireless Advanced Networking (NEW2AN 2004 and 2005), editors Y. Kouheryavy and J. Harju.

MAJOR TECHNICAL ACCOMPLISHMENTS

1. **A multicast based file system.** The design of new primitives for an innovative file system for HP. We designed and wrote a complete and working file system based on Scalable Reliable Multicast. The system was (and still is) well ahead of its time. We learned detailed knowledge of multicast implementation and scaling issues as well as building a reliable system from an unreliable network layer.
2. **Dimensioning links for IP telephony.** A network dimensioning software tool that calculated the number of calls¹ that can be statistically multiplexed onto a link. I obtained the project with TeliaSonera. I modelled, simulated and implemented a solution to the dimensioning problem and conducted a professional project followup. I learned to work with commercial operators in a working network. As well as the tool we helped administrators by *providing* router configurations which is normally performed by trial and error.
3. **A real-time voice handover module.** The goal was to create a fully-automated module for voice handovers based on network measurements. I made contact and obtained funding together with a small Swedish company, Optimobile AB, for their WiFi-GSM PBX product. I learned about the operation and needs of a small company. We implemented a cross-platform module using measured network parameters & precomputed PESQ scores to infer voice quality. The software is still used in products today.

FUNDED PROJECTS

- EU 5th, 6th and 7th framework projects
 - Three IPs one STREP, one NoE and two COST actions
- Swedish agency funded projects
 - Five Vinnova and KKS projects (Swedish funding agencies)
- Five industrially funded projects

OTHER INFORMATION

- Sports: Part-time gym instructor, play golf and football
- Languages: English (mother tongue), good German and Swedish abilities, Spanish (to university level), basic Portuguese & Greek.
- Travel: Visited over 50 countries & worked in 8. Contributed to the Lonely Planet series.

¹Number of calls translates into revenue.