**Andrew William Moore, PhD, CEng**

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## Present Appointment

**Computer Laboratory, University of Cambridge, UK**

| | |
|---|---|
| 1st October 2019-present: | **Professor in Networked Systems** |
| 2015-30th September 2019: | Reader in Systems |
| 2010-30th September 2015: | University Senior Lecturer |
| 2007-30th September 2010: | University Lecturer |

**NetFPGA C.I.C.**

2015-present:   Director, co-Founder

## Selected Previous Appointments

**Allen & Overy LLP, UK**

2008-2014:     Expert consultant

**AT&T Research, USA**

2006-2013:     Consultant

**Department of Computer Science,**
**Queen Mary, University of London, UK**

2005-2007:     EPSRC Academic (Roberts) Fellow

**Computer Laboratory, University of Cambridge, UK**

2002-2005:     Intel Research Fellow

## Academic Qualifications:

*PhD* 1997-2001, Computer Laboratory, University of Cambridge,
        *"Measurement-based management of network resources"*
*Masters in Computing (research) 1993-1994. Monash University,*
*Bachelors in Computing (1$^{st}$ class honours), 1988-1992, Monash University,*

## Professional Qualifications:

*CEng (Chartered Electrical Engineer), the Engineering Council through the IET (formerly IEE), 2006*

## Membership of Professional Societies:

*IET – Institute of Engineering and Technology, formerly IEE, (MIET)*
*ACM – Association of Computing Machinery (MACM)*
*IEEE – Institute of Electrical and Electronic Engineers (MIEEE)*

## Research Activities:

- Current research interests are the measurement, modelling, and mitigation of latency in networked computer systems using methodologies for high impact and repeatability in research through open-source hardware and software.
- Past work has included power-reduction using novel computer and network architectures, the application of machine-learning to automated network control and the integration of photonic systems within network and interconnect architectures
- Principle investigator to past and current EU, DARPA, NSF, and EPSRC grants with a portfolio value of £10.7M and a further £460,000 commercial donations
- I have research links with a number of UK and international companies (Xilinx, Intel Research, British Telecom, AT&T, Google, Facebook, Huawei, Broadcom, Cypress, NetApp, Micron, amongst others) and with Universities (Stanford, Cornell, University of Pennsylvania, UCB, UCSD, Imperial College London, UCL, QMUL, Bristol, etc.)
- Within the last 7 years, presented keynotes and invited research seminars to IEEE/REV ATC 2013, IEEE/ACM ANCS 2014, ICETE DCNet 2015, Huawei Strategic Technology Workshop 2017, ACM SOSR 2019, Dagstuhl Computer Science Series, University of Edinburgh, Google TechTalk, University of Massachusetts at Amherst, University of Pennsylvania, University of Wisconsin at Madison, Princeton University, Columbia University, Stanford University, KAIST, University of Glasgow, and Cambridge events.

## Current Teaching:

- 2$^{nd}$ year Computer Networking
- MPhil modules on network measurement and high-performance networking
- 3$^{rd}$ and 4$^{th}$ year, and Masters dissertation project supervisions
- PhD supervision (supervision or co-supervision of 11 PhD students)

## Administrative Duties Within Cambridge in the last 5 years:

- Current Member of Examiners board for higher degrees
- Past Chair of the Staff-Student Consultative Committee
- Past Member of Faculty Board and Member of the Teaching Committee

## Professional Activities (selected):

- Member of the referee panels, reviewer and assessor for Research Council UK (EPSRC), US National Science Foundation, Natural Sciences and Engineering Research Council of Canada, Swiss National Science Foundation, Dutch Technology Foundation STW, New Zealand Foundation for Research, Science and Technology
- Member of the TPC for Traffic Measurement and Analysis (TMA)
- Member of the TPC for ACM SIGCOMM 2014,2016
- Member of the TPC for USENIX Sym. on Networked Systems Design & Implementation (NSDI) 2014,2019
- Member of the TPC for ACMIEEE Symposium on Architectures for Networking and Communications Systems (ANCS) since 2010
- TPC Chair for ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS) 2014
- TPC Chair for the NetFPGA Developer Workshop various

## Selected Journal Publications:

- Rémi Oudin, Gianni Antichi, Charalampos Rotsos, **Andrew W. Moore**, Steve Uhlig, "OFLOPS-SUME and the art of switch characterization", IEEE Journal on Selected Areas in Communications, Sep 2018
- Marc Bruyere, Gianni Antichi, Eder L Fernandes, Remy Lapeyrade, Steve Uhlig, Philippe Owezarski, **Andrew W Moore**, Ignacio Castro, IEEE Journal on Selected Areas in Communications, Sep 2018
- Gianni Antichi, Ignacio Castro, Marco Chiesa, Eder L. Fernandes, Remy Lapeyrade, Daniel Kopp, Jong Hun Han, Marc Bruyere, Christoph Dietzel, Mitchell Gusat, **Andrew W. Moore**, Philippe Owezarski, Steve Uhlig, Marco Canini, "ENDEAVOUR: A Scalable SDN Architecture for Real-World IXPs," *Special Issue on Emerging Technologies in Software-driven Communication IEEE Journal on Selected Areas in Communications*, (35)11, Nov 2017
- Noa Zilberman, Philip M. Watts, Charalampos Rotsos, **Andrew W. Moore**, "Reconfigurable Network Systems and Software-Defined Networking," *Proceedings of the IEEE* 103(7), July 2015
- Noa Zilberman, **Andrew W. Moore**, Jon A. Crowcroft, "From photons to big-data applications: terminating terabits," *Philosophical Transactions of the Royal Society of London A*, Vol. 374, No. 2062, March 2016
- Noa Zilberman, Yury Audzevich, Adam Covington, Andrew W. Moore, "NetFPGA SUME: Toward Research Commodity 100Gb/s", *IEEE Micro*, 34(5), pp.32-41, Sep-Oct 2014
- Damien Fay, Andrew W Moore, Ken Brown, Michele Filosi and Giuseppe Jurman, "Graph metrics as summary statistics for Approximate Bayesian Computation with application to network model parameter estimation", *J. of Complex Networks*, April, 2014
- Yury Audzevich, Philip M. Watts, Andrew West, Alan Mujumdar, Simon W. Moore and Andrew W. Moore, "Power Optimized Transceivers for Future Switched Networks", *IEEE Transactions on VLSI Design*, 22(10), pp.2081-2092, October, 2014
- Phil Watts, Simon W. Moore, Andrew W. Moore "Energy implications of photonic networks with speculative transmission" *IEEE/OSA Journal of Optical Communications and Networking* Vol. 4, No. 6, pp.503-513, June, 2012
- Tom Auld, Andrew W. Moore, and Steve Gull, "Internet Application Identification using a Bayesian Neural Network", *IEEE Transactions on Neural Networks*, vol. 18, no. 1, pp. 223-239, January 2007

## Selected Conference Publications:

- Rolf Neugebauer, Gianni Antichi, José Fernando Zazo, Yury Audzevich, Sergio López-Buedo, **Andrew W. Moore**, "Understanding PCIe performance for end host networking", *ACM SIGCOMM*, Aug 2018 (*Top-rating for Reproducibility 2018*)
- Mark Handley, Costin Raiciu, Alexandru Agache, Andrei Voinescu, **Andrew W. Moore**, Gianni Antichi, Marcin Wójcik, "Re-architecting datacenter networks and stacks for low latency and high performance," In the *Proceedings of the Conference of the ACM SIGCOMM 2017*, Aug 2017 (*Best Paper*)
- Noa Zilberman, Matthew P. Grosvenor, Diana Andreea Popescu, Neelakandan Manihatty Bojan, Gianni Antichi, Marcin Wójcik, **Andrew W. Moore**, "Where Has My Time Gone?", PAM 2017, Mar 2017

- Matthew P. Grosvenor, Malte Schwarzkopf, Ionel Gog, Robert N. M. Watson, Andrew W. Moore, Steven Hand, and Jon Crowcroft, "Queues Don't Matter When You Can JUMP Them!", *Proceedings of the 12th NSDI,* May 2015 (*Best Paper*)
- Andrew W. Moore and Denis Zuev, "Internet Traffic Classification Using Bayesian Analysis Techniques, *Proceedings of ACM SIGMETRICS 2005*, Banff Canada, June 2005 (11 pages) *SIGMETRICS 2015 (Test of Time Award)*

**Selected Open Software/Hardware**

- PCIe-bench: A tool to understand PCIe implementations (since 2017) http://www.pcie-bench.org
- NetFPGA; Open Source hardware and software for network and systems research and education, jointly led since 2010 and Cambridge led since 2013. In a recent accolade, the NetFPGA platform received the ACM SIGCOMM SOSR Software Systems Award for 2019 http://www.netfpga.org
- Open Source Network Tester (OSNT); a package of hardware and software tools permitting industrial quality network testing and evaluation with an ambition of promoting reproducibility in (network) research (since 2013) http://www.osnt.org
- CONfigurable Transceiver Energy uSage Toolkit (CONTEST); a toolkit that allows the characterisation of the energy consumption of the physical layer of optical transceivers using real network traffic (since 2012) http://www.cl.cam.ac.uk/research/srg/netos/greenict/projects/contest
- Selena; a framework that uses Xen to provide high-performance and high-fidelity reproduction of Network Experiments (since 2013) http://selena-project.github.io/
- Weighted Spectral Distribution Toolkit; is a matlab toolbox for use with undirected graphs including obtaining the best fit (in the weighted spectral sense) of a topology generator to a target graph (since 2009) https://www.cl.cam.ac.uk/research/srg/netos/projects/archive/masts/wsd.html
- Ground Truth Verification System (GTVS): a toolkit for assisting in the labelling of network traffic data sets (2007-2010) http://www.cl.cam.ac.uk/research/srg/netos/brasil/gtvs/index.html
- FullStats; Code to permit creation of feature-lists (suitable for Machine-Learning) from network data (2007-2010) and AtoZ; a combination of hardware and software that performs application-specific identification of network traffic (2007-2010) http://www.cl.cam.ac.uk/research/srg/netos/brasil/downloads/
- GRIDprobe/Nprobe: Network protocol analysis (2002-2007) http://www.cl.cam.ac.uk/research/srg/netos/nprobe/downloads/index.html

**Selected Prizes and Awards**

2019
> ACM SIGCOMM SOSR *Software Systems Award* 2019 (for NetFPGA project)

2018
> ACM SIGCOMM *Top-rating for Reproducibility* 2018 (for Neugebauer *et al.)*

2017
> ACM SIGCOMM *Best Paper Award* 2017 (for NDP Handley *et al.*)

2015
> ACM SIGMETRICS *Test of Time Award* 2015 (for Moore&Zuev 2005)
> USENIX NSDI *Best Paper Award* 2015 (for Grosvenor *et al.*)

2014
> ACM/IEEE ANCS *Best Paper Award* 2014 (for Pediaditakis *et al.*)

2007-current
> *Honorary faculty*, School of Electrical Engineering and Computer Science, Queen Mary, University of London

2005-2007
> EPSRC Academic Fellowship, Queen Mary, University of London, UK

1996-2001
> Prince of Wales Scholarship, Cambridge Commonwealth Trust, UK
> Overseas Research Scholarship, UK
> Graduate Scholarship, University of Cambridge, Computer Laboratory, UK
> Graduate Scholarship, Corpus Christi College, Cambridge, UK

1994
> Distinguished Dissertation Award, Monash University, Australia